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METEOROLOGICAL RESULTS OF THE BYRD ANTARCTIC EXPEDITIONS 1928–30, 1933–35: SUMMARIES OF DATA

By G. GRIMMINGER
Aerological Division, D. M. LITTLE *in charge, Weather Bureau, Washington, D. C.*

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SUPPLEMENTS TO THE MONTHLY WEATHER REVIEW

During the summer of 1913 the issue of the system of publications of the Department of Agriculture was changed and simplified so as to eliminate numerous independent series of bureau bulletins. In accordance with this plan, among other changes, the series of quarto bulletins—letters from A to Z —and the octavo bulletins—numbered from 1 to 44—formerly issued by the U. S. Weather Bureau have come to their close.

Contributions to meteorology such as would have formed bulletins are authorized to appear hereafter as Supplements of the MONTHLY WEATHER REVIEW. (Memorandum from the Office of the Assistant Secretary, May 18, 1914).

These supplements comprise those more voluminous studies which appear to form permanent contributions to the science of meteorology and of weather forecasting, as well as important communications relating to the other activities of the U. S. Weather Bureau. They appear at irregular intervals as occasion may demand, and conta in approximately 100 pages of text, charts, and other illustrations.

Owing to necessary economies in printing, and for other reasons, the edition of SUPPLEMENTS is much smaller than that of the MONTHLY WEATHER REVIEW. SUPPLEMENTS will be sent free of charge to cooperating meteorological services and institutions and to individuals and organizations cooperating with the bureau in the researches which form the subject of the respective supplements. Additional copies of this SUPPLEMENT may be obtained from the Superintentent of Documents, Washington, D. C., to whom remittances should be made.

The price of this Supplement is 35 cents.

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INTRODUCTION

The meteorological data obtained by the two Byrd Antarctic Expeditions, 1928–30 and 1933–35, have been published in MONTHLY WEATHER REVIEW SUPPLEMENT 41 (*1*); the present volume is devoted to tabular and graphical summaries of these data.

Both expeditions based at exactly the same location, Little America. In 1934 a secondary meteorological station, Bolling Advance Base, approximately 100 geographical miles due south of Little America, was occupied alone by Admiral Byrd for 6 months during the dark season. The coordinates of the stations were:

LITTLE AMERICA

Latitude 78°34′06″ S.; longitude 163°55′58″ W.
Height of barometer above sea level, 30 feet.
Height of surface above sea level, 46 feet.

BOLLING ADVANCE BASE

Latitude 80°07′30″ S; longitude 163°55′ W.

Height of Advance Base above sea level, computed by method 1=246 feet; by method 2, 280 feet (for the methods of computing the altitude of Advance Base, see (*1*), p. 7).

Much of the work of preparing these statistical tables was carried on by the writer during his spare time; and assistance was provided by the Works Progress Administration, Massachusetts State Project No. 14344, for which acknowledgment is gratefully made.

Although it has not been possible to check all of the tables presented herein, many of them have been checked, especially those giving the direction and velocity of the wind at upper levels as computed from the pilot-balloon ascents. The author is greatly indebted to R. J. Smith of the Weather Bureau for his valuable assistance in this connection.

EXPLANATION OF THE TABLES

1. TEMPERATURE SOUNDINGS

Instruments and methods.—With few exceptions, most of the free-air temperature soundings on the first expedition, 1928–30, were made with kites. These kites were of the standard type as formerly used by the United States Weather Bureau and are described in (**1A**). The meteorographs, two in number, were of the Marvin type, also described in (**1A**).

The kite equipment consisted of a special lightweight hand reel, and a large quantity of piano wire. To shelter the kite equipment, a small house was built with walls of snow blocks and a roof of tarpaulin supported by bamboo poles. Some warmth was furnished by burning seal blubber in an improvised stove. It was intended to make kite ascents throughout the entire period during which the base at Little America was occupied; and it is very unfortunate that during a blizzard in March 1929 a box containing essential kite parts was lost under the snow and the ascents could not be begun until September 1929 when the replacements for the lost parts were finally finished. The instruments were tested and calibrated several times at Little America.

Because of the difficulties encountered on the first expedition in using kites, a small plane was used instead on the second expedition, 1933–35. An autogyro was taken along primarily for the purpose of making temperature soundings; the advantages of this type of plane were the small fuel consumption, the relatively small amount of work required to prepare it for flight, and the ease with which it could take-off and land; its chief disadvantage lay in its relatively low ceiling, the maximum altitude it could attain being about 3 km. The ascents with the autogyro were begun on September 1, 1934, but unfortunately just after the take-off for the 11th ascent on September 25, the plane got out of control, crashed to the surface, and was completely wrecked. Since it had been planned to make daily ascents when the weather permitted and since the other planes were not ready for flying at that time, the loss of the autogyro was a serious blow to the meteorological program. It was not unitl November that the ascents could be continued and even then these could not be carried out with the regularity which was desired, since the two remaining planes were usually needed for other purposes and required more work to prepare for a flight and more fuel to operate.

On the second expedition, three aerometeorographs of the Friez type were used, which are described in (**2**). In two of these, the clocks did not perform satisfactorily at low temperatures, with the result that almost all of the soundings were made with the remaining one. As on the first expedition, these instruments were re-tested and re-calibrated at Little America, even though this had been done in the United States before the departure of the expedition.

In using the autogyro, the aerometeorograph was suspended in a metal frame attached to the wing strut. In using the Pilgrim and large Condor planes, the instrument was enclosed in a small case which was suspended inside the plane at the rear of the cabin. This arrangement not only reduced the vibration of the instrument to a minimum but also made it possible to change the record sheets when long flights were made from the base at Little America, an aerometeorograph record being obtained on nearly all such flights. To provide for proper ventilation of the aerometeorograph, there were two air vents in the case in which it was contained, one at the front and another at the rear. From a vent on the top of the fuselage, the outside air was led to the forward vent in the case containing the aerometeorograph by means of a tube of windproof cloth; the air coming in through the forward vent then circulated past the instrument and escaped through the vent at the rear. The air circulation provided in this way seemed quite ample and satisfactory, the velocity of flow past the instrument amounting to perhaps 10 or 12 miles per hour. This same method of installing the meteorograph in the plane was also used in 1929.

There is one circumstance in connection with this method of "exposing" the aerometeorograph which should be mentioned. Sometimes when the instrument was installed in the plane before the take-off, the temperature inside of

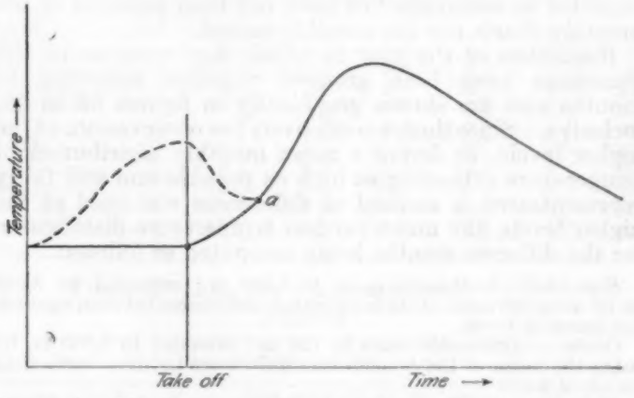

FIGURE A.—Effect on aerometeorograph record of heating before take-off. (Schematic).

the plane became considerably higher than that of the outside air as a result of insulation on the fuselage. Consequently, when the instrument was installed in the plane prior to the take-off, it recorded a temperature higher than that of the outside air, and it was not until a short time after the take-off that the recorded temperature. came into equilibrium with the free-air temperature. Usually a surface inversion was present; the resultant effect is illustrated in figure A.

Owing to the vigorous flow of the outside air past the meteorograph immediately after the take-off, the equilibrium point A, judging from the records, was probably attained within a short time, say within 2 or 3 minutes after the take-off, corresponding to an altitude of about 200 or 300 meters. It is thought that in most cases the first significant level was at a higher altitude, where this effect was no longer present, although it must be admitted that in some cases when the heating effect at take-off did occur, the temperature changes within the first few hundred meters were lost.

Results of the kite and airplane ascents.—The results of all the kite and airplane ascents are shown graphically in figures 1 to 85. The soundings are numbered the same as in the previous volume of data (1). With each curve is given the date, year and time of take-off or landing, as the case may be, and also the time of the pilot-balloon ascent nearest in time to that of the temperature sounding. The direction and velocity of the surface wind at the beginning of the sounding are given to the left; the other wind data are the direction and velocity of the wind at the standard levels as determined from the pilot-balloon observation. The significant levels are indicated by circles. In cases where the records of the kite ascents permitted, both the ascent and descent have been worked out. The curves include several soundings which, although not taken right at the base, were within a 100-mile radius and can probably be considered as representative of conditions at Little America. Soundings of this nature have been used in the monthly means.

An aerometeorograph record was obtained for practically all of the airplane exploration flights; and the portions of the record obtained just after the take-off and before the landing, when the plane was not too far removed from Little America, have been considered as soundings even though they do not extend to very high altitudes. During some of the flights the plane underwent considerable variations of altitude at positions fairly far removed from Little America; these portions of the record have been regarded as soundings but have not been included in the monthly charts nor the monthly means.

Regardless of the year in which they were made, the soundings have been grouped together according to months and are shown graphically in figures 86 to 90, inclusive. Since there are relatively few observations at the higher levels, to derive a mean monthly distribution of temperature extending as high as possible and still fairly representative, a method of differences was used at the higher levels, the mean vertical temperature distribution for the different months being computed as follows:

September.—Arithmetic mean to 2,500 m.; extended to 3,000 m. by using the mean of the temperature differences between succeeding standard levels.

October.—Arithmetic mean to 750 m.; extended to 1,500 m. by using the mean of the temperature differences between succeeding standard levels.

November.—Arithmetic mean to 1,000 m.; extended to 3,000 m. by using the mean of the temperature differences between succeeding standard levels.

December.—Arithmetic mean to 2,500 m.; extended to 3,000 m. by using the mean of the temperature differences between succeeding standard levels.

January.—Arithmetic mean to 3,000 m.; extended to 4,500 m. by using the mean of the temperature differences between succeeding standard levels.

In some cases where a sounding did not quite reach the next standard level, a short extrapolation has been used. Some of the soundings are descents, and we therefore have instances of two soundings on the same day, usually not a very long time apart. To avoid giving undue weight to such days, these soundings have each been given a weight of one-half where they are used together. The following are the soundings in groups of two which when used together have each been given a weight of one-half.

October	November	December	January
13 and 14	19 and 20	48 and 49	76 and 77
	24 and 25	51 and 52	78 and 79
	26 and 27	56 and 57	
	32 and 33	58 and 59	
	38 and 40	60 and 61	
	41 and 42	63 and 64	
	44 and 45	68 and 69	
	46 and 47	70 and 71	

In cases where only one sounding of the group is used, that sounding is given a weight of one. The above method of weighting has also been applied in forming the numbers of observations at the various standard levels.

The mean vertical temperature distribution, computed as stated above, is given in table 1, with the numbers of observations at the different standard levels in table 2. Corresponding curves are given in figure 91 by the full lines and are indicated in the monthly charts by heavy lines. From table 2 it is seen that the number of observations drops off quite rapidly with altitude. This is mainly the result of the fact that the ascents by airplane have been combined with those by kite, and the latter did not extend to very high altitudes.

It is possible to derive a mean vertical temperature distribution in a way that will emphasize any given general characteristics exhibited by the majority of the individual soundings. This procedure has been used by Sverdrup (3). In September, for example, nearly all the soundings show a layer next to the surface having a rapid increase of temperature with altitude, and an adjacent layer above in which the temperature increases still further but at a smaller rate. To compute mean values so as to emphasize this characteristic temperature distribution, we may calculate the following values: the mean temperature at the surface t_0; the mean height of the layer with rapid temperature increase h_1, and the mean temperature at the top of this layer t_1; the mean height h_2 of the super-adjacent layer having a smaller rate of temperature increase, and the mean temperature at the top of this layer t_2. Only those soundings showing the given characteristic have been used in the computation; and the mean temperatures for succeeding standard levels have been obtained by applying to these soundings the same procedure used in the first method for getting the mean temperature distribution. Out of a total of 9 soundings during September 1929 and 1934, all but one showed the characteristic inversion; soundings 1 and 4 have not been counted since they do not extend high enough to show this property. An examination of the soundings for the months October, November, December, and January shows that the majority of the soundings in each of these months also exhibit a surface inversion of temperature, as brought out more clearly by the following tabulation; in this tabulation those cases in which there was a small isothermal layer next to the surface, with an inversion immediately above, have been regarded as surface inversions:

Month	Total number of soundings	Number of soundings with surface inversion	Number of soundings without surface inversion
October	5	5	0
November	23	18	5
December	18	13	5
January	5	5	0

Thus, during the months from October to January, the majority of the soundings in each month are characterized by a surface inversion of temperature, and use will be made of this fact to compute the mean temperature distributions by a second method. In using this method only those soundings having the characteristic surface

inversion will be used and the following values will be computed: The mean temperature at the surface t_0; the mean height of the inversion layer h_1, and the mean temperature at the top of this layer t_1; the mean temperature for succeeding standard levels is obtained by applying to these soundings the same procedure used in the first method. The resulting mean temperature distributions as computed by this second method are given in table 4 and are represented graphically in figure 91 by the dotted lines.

From the soundings represented in figure 86, we see that every one of these has a large surface inversion of temperature. Disregarding 1 and 4 which do not extend high enough, all of the soundings, except 10, show a characteristic stratification of temperature such that there is a rapid increase in temperature in the layer just above the surface, followed by a less rapid increase in the layer above. After the highest temperature is reached there is then a fairly uniform decrease in temperature. The altitude of the top of the inversion where the highest temperature is reached, which can be regarded as the thickness of the cold layer, is indicated by the figures in table 7.

In table 6 are given the mean lapse rates, with low and high wind velocities, from the surface to the first significant level; that is, in the very lowest layer. In the low velocity group are included those cases when the surface velocity at the time of the sounding was less than 5.0 m. p. s.; the high-velocity group contains the cases when the surface velocity was equal to or greater than 5.0 m. p. s., and it is seen from table 6 that this gives nearly the same number of cases in each group when the total number of soundings is considered. We do not have data for the whole year, since the soundings were made only during the period September to January, inclusive. The values for September have been worked out separately, since this is the coldest month during which soundings were made and serves to represent winter conditions. October and November have been combined together and may be taken as representative of spring conditions; while the combination of December and January will serve to indicate summer conditions.

The mean vertical distribution of pressure and temperature at Little America, and at Cape Evans for November and December, are given in table 10; and that for September at Little America, and August at Cape Evans, in table 11. The mean values for Cape Evans have been computed from the data given by Simpson (**9**). The mean temperature curves are shown in figures 95 and 96. Since the values for Cape Evans are based on a small number of ascents, and also because these were made in a different year (1911), it is difficult to say how much weight can be given to the comparison of the curves in figures 95 and 96.

TABLE 1.—*Mean monthly vertical temperature distribution at Little America*

METHOD 1

[Mean temperature, ° C.]

Altitude above sea level (m.)	September 1929, 1934	October 1929	November 1929, 1934	December 1929, 1934	January 1935	Mean September–January
	° C.	° C.	° C.	° C.	° C.	° C.
4,500	-------	-------	-------	-------	[1] −23. 9	-------
4,000	-------	-------	-------	-------	[1] −20. 9	-------
3,500	-------	-------	-------	-------	[1] −17. 8	-------
3,000	[1] −33. 1	-------	[1] −26. 7	[1] −18. 3	−14. 8	−23. 2
2,500	−31. 0	-------	[1] −23. 4	−15. 2	−12. 8	−20. 6
2,000	−28. 6	-------	[1] −21. 4	−12. 8	−10. 4	−18. 4
1,500	−25. 7	[1] −19. 8	[1] −19. 4	−10. 6	−7. 8	−16. 7
1,000	−25. 6	[1] −18. 9	−17. 0	−8. 0	−5. 8	−15. 1
750	−25. 8	−17. 5	−16. 1	−7. 0	−4. 8	−14. 2
500	−27. 5	−15. 8	−14. 9	−6. 5	−3. 9	−13. 7
250	−31. 9	−15. 4	−14. 9	−7. 6	−4. 6	−14. 9
Surface, 14–18	−42. 3	−18. 5	−16. 3	−8. 7	−6. 8	−18. 5

[1] Computed by using mean of temperature differences.

TABLE 2.—*Number of observations at the different standard levels from the kite and airplane ascents*

METHOD 1

Altitude above sea level (m.)	September 1929, 1934	October 1929	November 1929, 1934	December 1929, 1934	January 1935	Total
4,500	-------	-------	-------	-------	1	1
4,000	-------	-------	-------	-------	3	3
3,000	1	-------	3	1	4	9
2,500	6	-------	5	6	4	21
2,000	8	-------	6	6	5	25
1,500	9	1	7	7	5	29
1,000	9	2	15	9	5	40
750	9	3	19	14	5	50
500	10	5	23	16	5	59
250	11	5	23	18	5	62
Surface, 14–18	11	5	23	18	5	62

TABLE 3.—*Lapse rate of mean temperature,* $\frac{° C.}{100 m.}$

METHOD 1

Interval (m.)	September	October	November	December	January
4,000–4,500	-------	-------	-------	-------	0. 600
3,000–4,000	-------	-------	-------	-------	. 610
2,500–3,000	0. 420	-------	0. 660	0. 620	. 400
2,000–2,500	. 480	-------	. 400	. 480	. 480
1,500–2,000	. 580	-------	. 400	. 440	. 520
1,000–1,500	. 020	. 180	. 480	. 520	. 400
750–1,000	−. 080	. 560	. 360	. 400	. 400
500–750	−. 680	. 680	. 480	. 200	. 360
250–500	−1. 760	. 160	. 000	−. 440	−. 280
Surface–250	−4. 444	−1. 325	−. 598	−. 470	−. 940

NOTE.—The negative sign indicates that the temperature increases with altitude.

TABLE 4.—*Mean vertical temperature distribution, °C.*

METHOD 2

	t_0	h_1	t_1	h_2	t_2	$t_{1,500}$	$t_{2,000}$	$t_{2,500}$	$t_{3,000}$
September 1929 and 1934	−43.2	318 m.	−28.2	942 m.	−23.6	−25.2	−28.1	−30.1	[1]−32.6
Number of observations	8	8	8	8	8	8	7	5	1

	t_0	h_1	t_1	t_{500}	t_{750}	$t_{1,000}$	$t_{1,500}$
October 1929	−18.5	269 m.	−14.3	−15.7	−17.5	[1]−18.9	[1]−19.8
Number of observations	5	5	5	4	3	2	1

	t_0	h_1	t_1	t_{750}	$t_{1,000}$	$t_{1,500}$	$t_{2,000}$	$t_{2,500}$	$t_{3,000}$
November 1929 and 1934	−17.4	466 m.	−13.3	−14.9	[1]−15.9	[1]−17.9	[1]−20.0	[1]−22.0	[1]−25.3
Number of observations	18	18	18	12	9	6	5	5	3

	t_0	h_1	t_1	t_{750}	$t_{1,000}$	$t_{1,500}$	$t_{2,000}$	$t_{2,500}$	$t_{3,000}$
December 1929 and 1934	−9.5	493 m.	−5.6	−6.4	−7.3	−10.4	−12.5	−15.1	[1]−18.2
Number of observations	13	13	13	10	8	7	6	6	1

	t_0	h_1	t_1	t_{750}	$t_{1,000}$	$t_{1,500}$	$t_{2,000}$	$t_{2,500}$	$t_{3,000}$	$t_{4,000}$	$t_{4,500}$
January 1935	−6.8	450 m.	−3.4	−4.8	−5.8	−7.8	−10.4	−12.8	−14.8	[1]−20.9	[1]−23.9
Number of observations	5	5	5	5	5	5	5	4	4	3	1

[1] Computed by using mean lapse rate.

TABLE 5.—*Thickness of the cold layer in winter*

Number of sounding	2	3	5	6	7	8	9	10	11	Mean.
Date, September 1934	2	3	6	7	10	11	12	16	17	
Thickness of cold layer (m.)	1,309	468	565	748	1,468	1,442	932	289	606	870.
Surface temperatures, ° C	−39.0	−38.3	−37.4	−45.2	−45.6	−44.2	−46.9	−40.6	−48.9	−42.9.
Temperature at top of inversion, ° C	−18.8	−20.5	−25.4	−24.6	−26.5	−25.1	−22.4	−25.2	−25.6	−23.8.
Temperature increase in the cold layer, ° C.	20.2	17.8	12.0	20.6	19.1	19.1	24.5	15.4	23.3	19.1.
Wind direction at top of inversion	SE	E	SW	SSW	WNW	WSW	SE	E	WSW	
Wind direction at the surface	S	S	W	W	SW	SE	S	SE	SW	
Wind direction at 2,000 m	SE	ENE	W	SW	WNW	NNW	SE	NW	SSW	
Temperature at 2,000 m., ° C	−23.3	−26.4	−29.8	−30.4	−28.3	−26.7	−25.3	−32.3	−29.8	
Mean temperature at 2,000 m., ° C	−28.6	−28.6	−28.6	−28.6	−28.6	−28.6	−28.6	−28.6	−28.6	
Departure from the mean, ° C	+5.3	+2.2	−1.2	−1.8	+0.3	+1.9	+3.3	−3.7	−1.2	

TABLE 6.—*Mean lapse rate in the lowest layer with low and high wind velocities*

SEPTEMBER

Wind velocity m./sec.	≤5.0	≥5.0	All winds
Number of soundings	8	3	11
Mean wind velocity m./sec	2.5	6.3	3.5
Mean lapse rate in lowest layer °C/100 m	−4.92	−3.89	−4.64

OCTOBER AND NOVEMBER

Number of soundings	14	23	37
Mean wind velocity m./sec	2.9	6.5	5.1
Mean lapse rate in lowest layer °C/100 m	−1.34	−0.96	−1.11

TABLE 6.—*Mean lapse rate in the lowest layer with low and high wind velocities*—Continued

DECEMBER AND JANUARY

Wind velocity m./sec.	≤5.0	≥5.0	All winds
Number of soundings	16	17	33
Mean wind velocity m/sec	2.5	6.7	4.5
Mean lapse rate in lowest layer °C/100 m	−1.14	−0.01	−0.55

ENTIRE PERIOD: SEPTEMBER-JANUARY

Number of soundings	38	43	81
Mean wind velocity m./sec	2.6	6.7	4.7
Mean lapse rate in lowest layer °C/100 m	−2.01	−0.78	−1.36

TABLE 7.—*Mean potential temperature, °A*

METHOD 1

Altitude above sea level (m.)	September 1929, 1934	October 1929	November 1929, 1934	December 1929, 1934	January 1935	Mean, September–January
4,000					293.6	
3,000	271.8		276.1	286.5	289.1	280.9
2,500	269.7		275.3	283.9	285.9	278.7
2,000	266.9		272.0	281.1	283.1	275.8
1,500	264.6	269.7	269.1	278.1	280.6	272.4
1,000	259.5	265.3	267.0	275.8	277.4	269.0
750	256.6	264.4	265.4	274.0	276.0	267.3
500	252.4	263.8	264.0	272.0	274.2	265.3
250	245.4	261.5	261.4	268.3	271.1	261.5
Surface 14–18	232.5	256.0	257.7	264.8	266.7	255.5

TABLE 8.—*Lapse rate of mean potential temperature,* $\frac{°A}{100\ m.}$

Interval (m.)	September	October	November	December	January
3,000–4,000					0.450
2,500–3,000	0.420		0.160	0.520	.640
2,000–2,500	.560		.660	.560	.560
1,500–2,000	.460		.580	.600	.500
1,000–1,500	1.020	0.880	.420	.460	.640
750–1,000	1.160	.360	.640	.720	.560
500–750	1.680	.240	.560	8.00	.720
250–500	2.800	1.080	1.040	1.480	1.240
Surface–250	5.513	2.200	1.581	1.496	1.880

TABLE 9.—*Mean vertical pressure distribution, mb.*

[Mean pressure, mb.]

Altitude above sea level (m.)	September 1929, 1934	October 1929	November 1929, 1934	December 1929, 1934	January 1935	Mean, September–January
4,000					591.3	
3,000	651.0		674.3	666.0	677.5	667.2
2,500	687.7		713.2	716.7	723.2	710.2
2,000	738.6		764.5	765.7	772.0	760.2
1,500	791.2	804.0	815.7	817.1	824.0	810.4
1,000	848.7	861.5	866.0	872.1	878.6	865.4
750	878.9	888.0	895.2	902.4	907.1	894.3
500	910.9	917.4	926.2	932.3	937.3	924.8
250	941.9	949.0	956.9	963.5	967.5	955.8
Surface, 14–18	973.8	978.8	986.9	992.6	994.7	985.4

TABLE 10.—*Mean vertical temperature and pressure distribution for November and December at Little America and at Cape Evans*

Altitude (m.)	Little America, November and December 1929, 1934		Cape Evans, November and December 1911	
	°C.	mb.	°C.	mb.
Surface	−12.5	989.8	−7.3	1005.9
250	−11.2	960.2		
500	−10.7	929.2	−10.4	943.2
750	−11.6	898.8		
1,000	−12.5	869.0	−14.1	883.9
1,500	−15.0	816.4	−17.8	827.2
2,000	−17.1	765.1	−21.0	773.0
2,500	−19.3	715.0	−24.4	722.5
3,000	−22.5	670.2	−26.5	674.0
3,500			−28.7	632.6
4,000			−31.2	589.9

TABLE 11.—*Mean vertical temperature and pressure distribution for August at Cape Evans and for September at Little America*

Altitude (m.)	Little America, September 1929, 1934		Cape Evans, August 1911	
	°C.	mb.	°C.	mb.
Surface	−42.3	973.8	−35.2	984.9
250	−31.9	941.9		
500	−27.5	910.9	−31.2	917.2
750	−25.8	878.9		
1,000	−25.6	848.7	−30.4	855.2
1,500	−25.7	791.2	−31.8	797.9
2,000	−28.6	738.6	−34.2	742.2
2,500	−31.0	687.7	−36.6	688.0
3,000	−33.1	651.0	−39.0	639.9

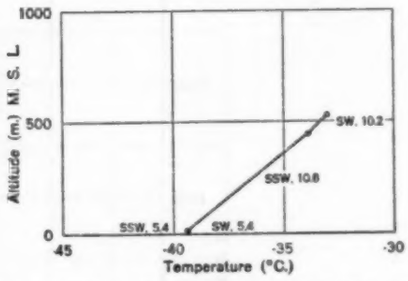

FIGURE 1, No. 1.—Kite. September 22, 1929, 15h. 09m.; winds at 9h. 05m.

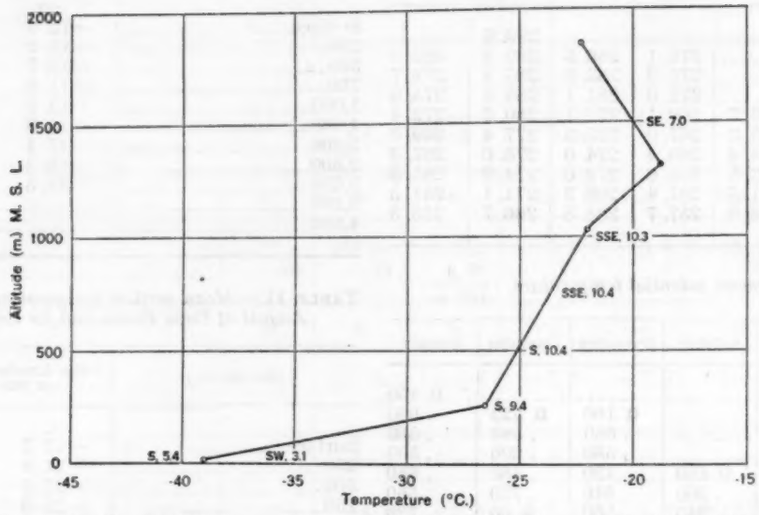

FIGURE 2, No. 2.—Airplane. September 1, 1934, 13h. 05m.; winds at 10h. 18m.

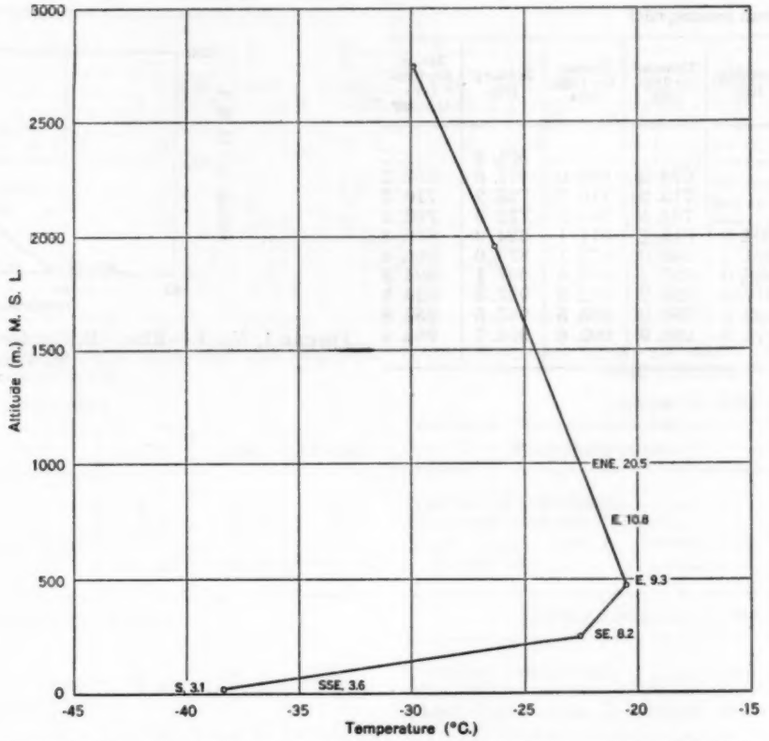

FIGURE 3, No. 3.—Airplane. September 3, 1934, 9h. 22m.; winds at 9h. 48m.

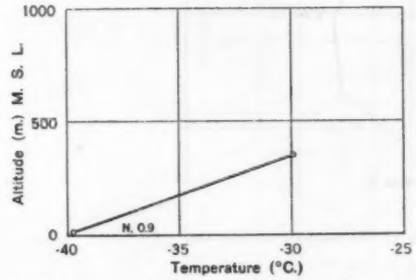

FIGURE 4, No. 4.—Airplane. September 4, 1934, 9h. 21m.

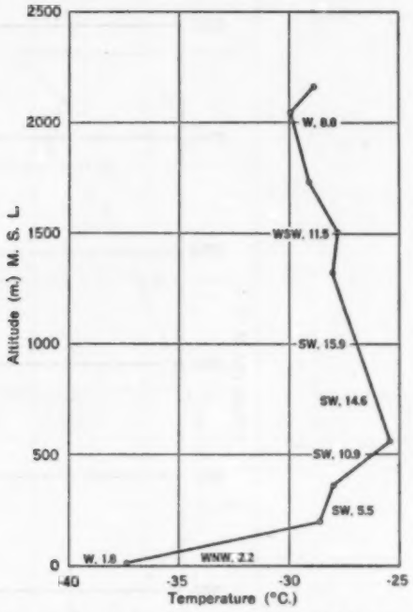

FIGURE 5, No. 5.—Airplane. September 6, 1934, 12h. 25m.; winds at 13h. 02m.

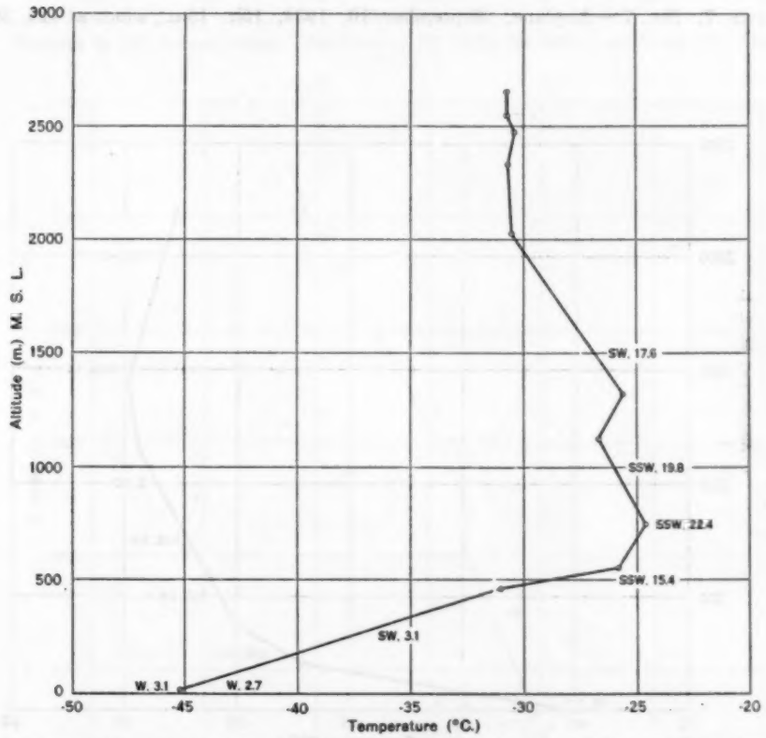

FIGURE 6, No. 6.—Airplane. September 7, 1934, 9h. 47m.; winds at 10h. 06m.

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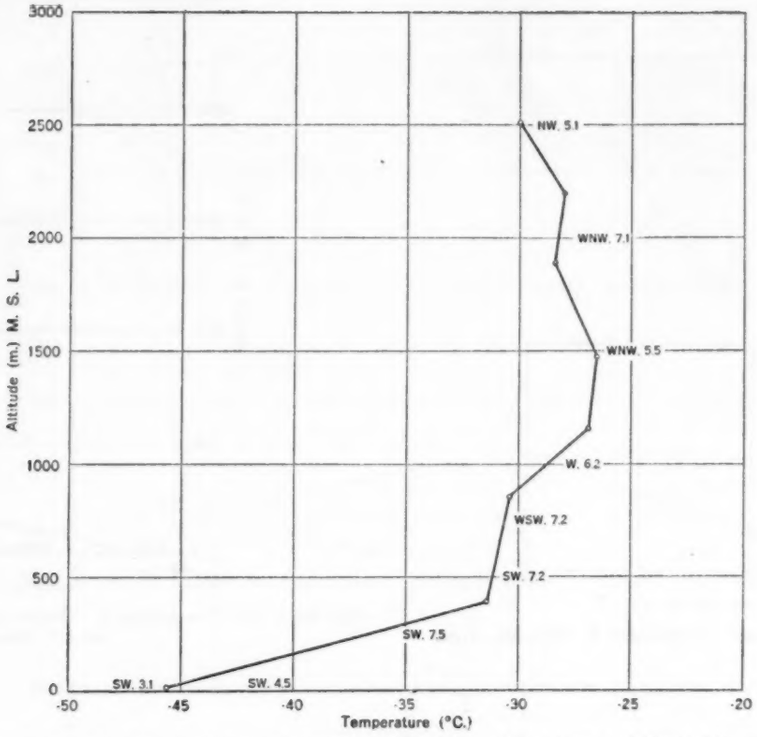

FIGURE 7, No. 7.—Airplane. September 10, 1934, 15h. 15m.; winds at 12h. 58m.

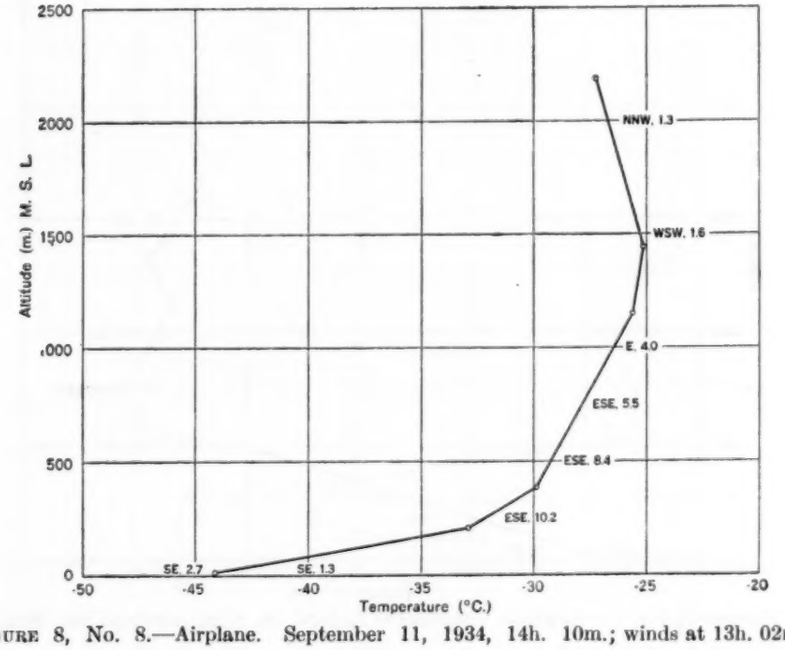

FIGURE 8, No. 8.—Airplane. September 11, 1934, 14h. 10m.; winds at 13h. 02m.

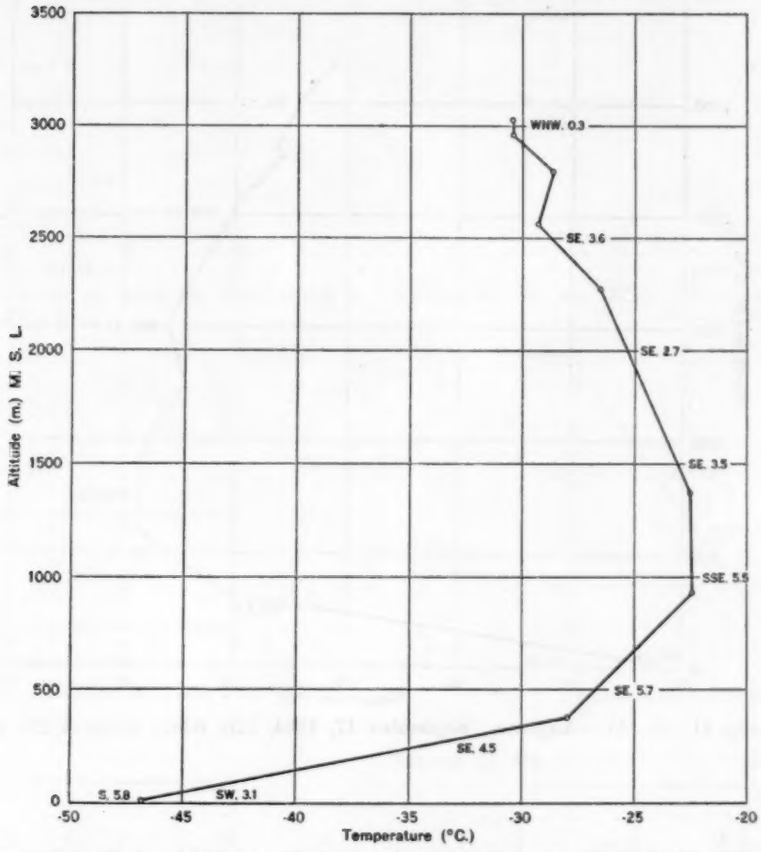

FIGURE 9, No. 9.—Airplane. September 12, 1934, 9h. 44m.; winds at 10h. 15m.

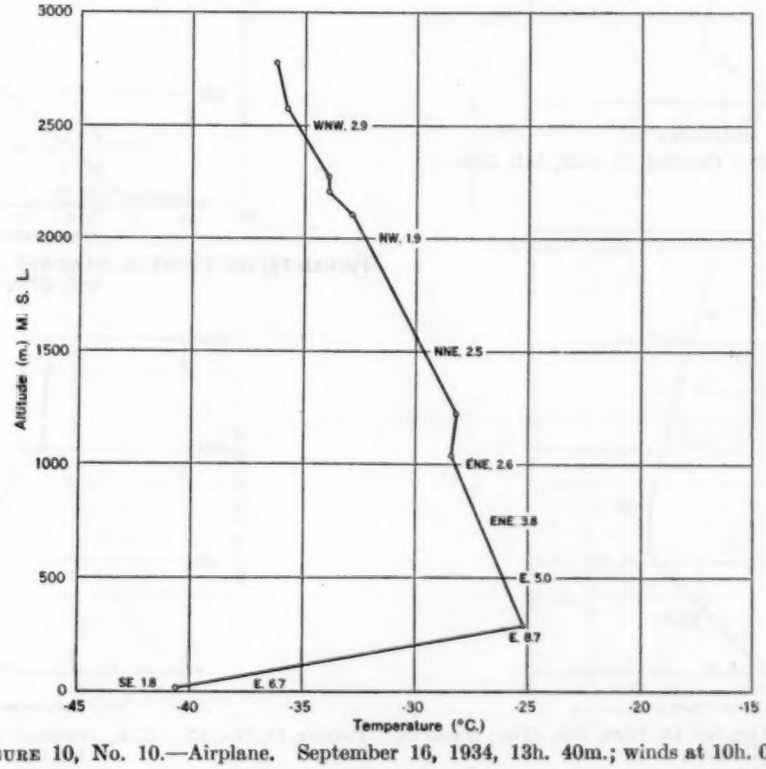

FIGURE 10, No. 10.—Airplane. September 16, 1934, 13h. 40m.; winds at 10h. 05m.

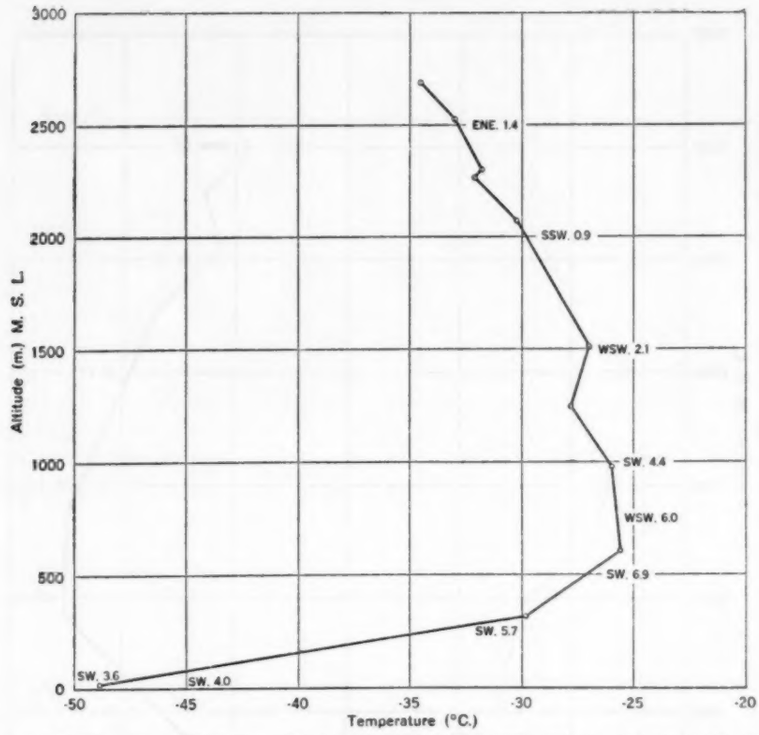

FIGURE 11, No. 11.—Airplane. September 17, 1934, 12h. 03m.; winds at 12h. 53m.

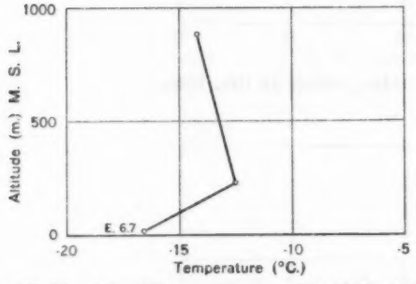

FIGURE 12, No. 12.—Kite. October 17, 1929, 14h. 53m.

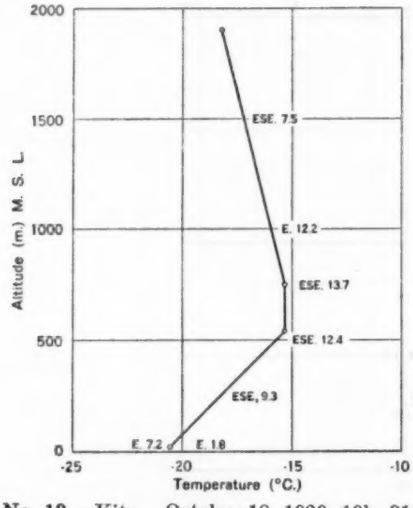

FIGURE 13, No. 13.—Kite. October 18, 1929, 10h. 31m.; winds at 8h. 37m.

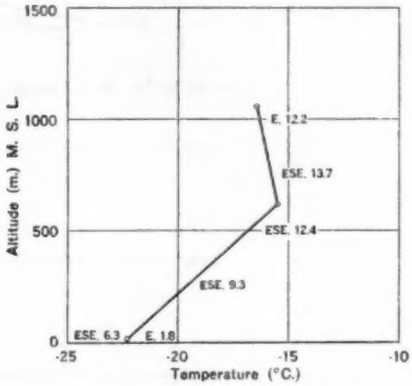

FIGURE 14, No. 14.—Kite. October 18, 1929, 13h. 50m.; winds at 8h. 37m.

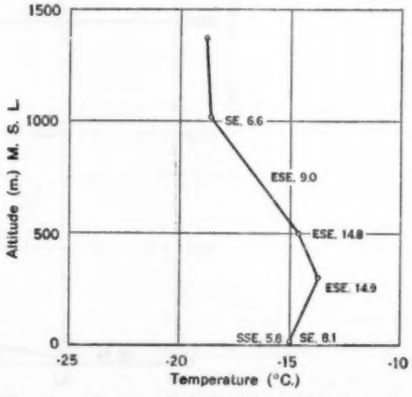

FIGURE 15, No. 15.—Kite. October 21, 1929, 15h. 31m.; winds at 9h. 02m.

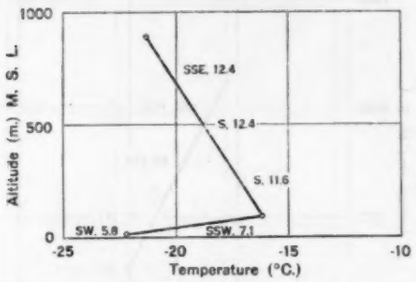

FIGURE 16, No. 16.—Kite. October 22, 1929, 9h. 22m.; winds at 13h. 14m.

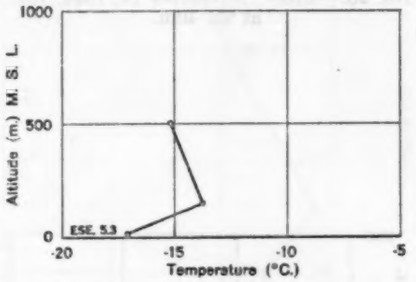

FIGURE 17, No. 17.—Kite. October 30, 1929, 16h. 30m.

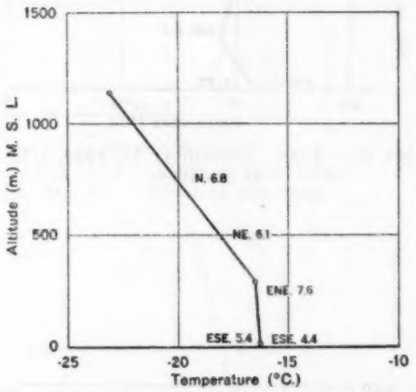

FIGURE 18, No. 18.—Kite. November 2, 1929, 18h. 10m.; winds at 17h. 40m.

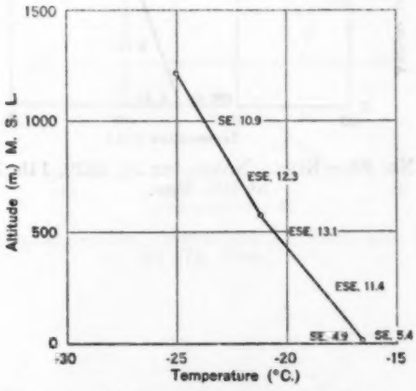

FIGURE 19, No. 19.—Kite. November 5, 1929, 10h. 25m.; winds at 9h. 14m.

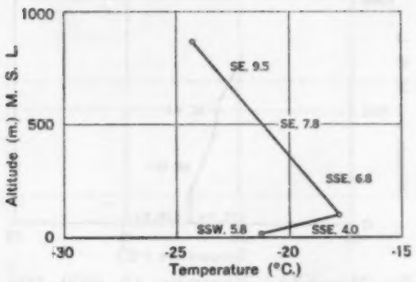

FIGURE 20, No. 20.—Kite. November 5, 1929, 19h. 41m.; winds at 21h. 00m.

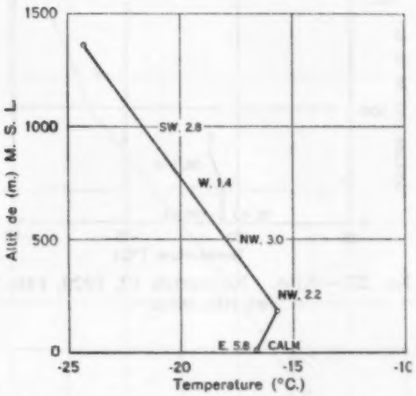

FIGURE 21, No. 21.—Kite. November 7, 1929, 14h. 55m.; winds at 9h. 24m.

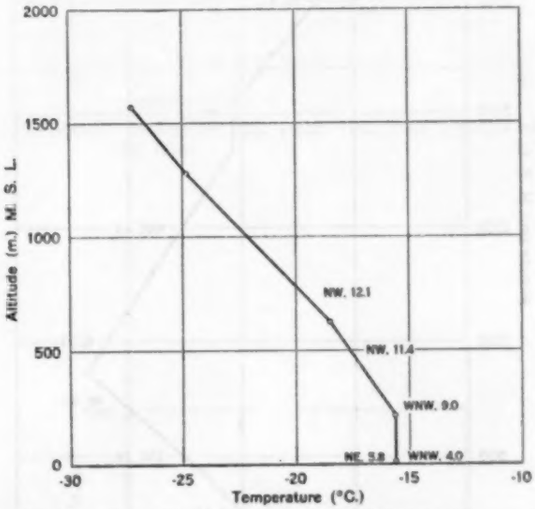

FIGURE 22, No. 22.—Kite. November 8, 1929, 15h. 55m.; winds at 13h. 50m.

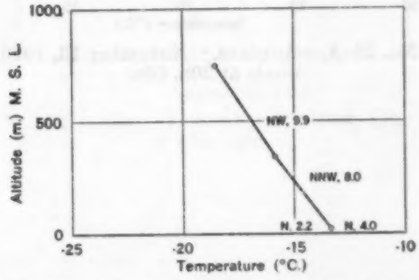

FIGURE 23, No. 23.—Kite. November 9, 1929, 11h. 58m.; winds at 9h. 14m.

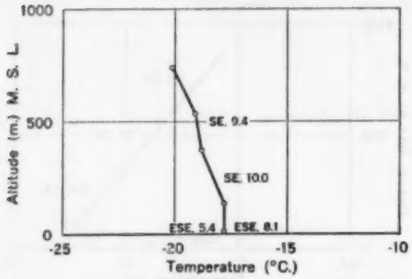

FIGURE 24, No. 24.—Kite. November 12, 1929, 12h. 45m.; winds at 10h. 08m.

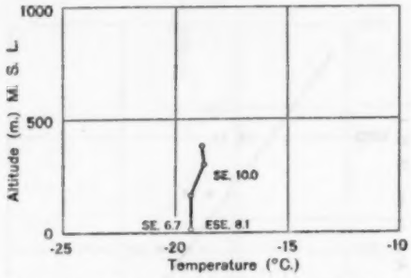

FIGURE 25, No. 25.—Kite. November 12, 1929, 14h. 27m.; winds at 10h. 08m.

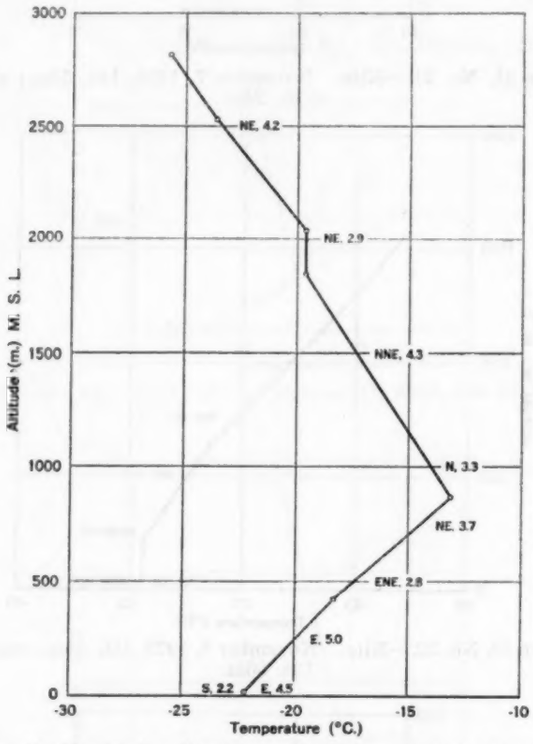

FIGURE 26, No. 25-A.—Airplane. November 13, 1929, 17h. 24m.; winds at 20h. 00m.

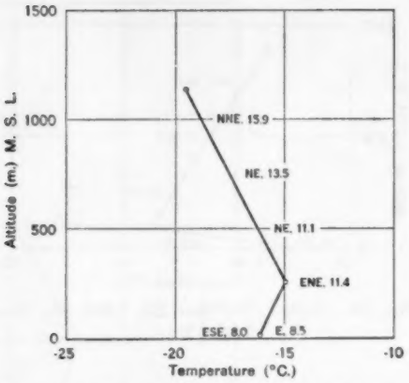

FIGURE 27, No. 26.—Kite. November 14, 1929, 10h. 22m.; winds at 9h. 40m.

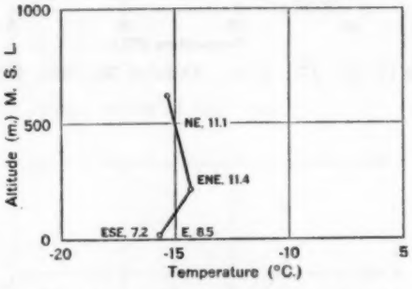

FIGURE 28, No. 27.—Kite. November 14, 1929, 15h. 25m.; winds at 9h. 40m.

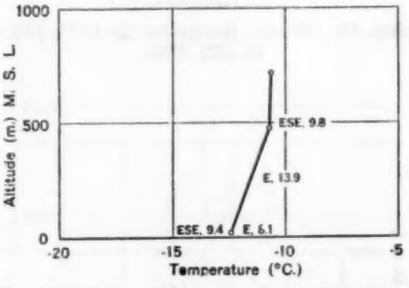

FIGURE 29, No. 28.—Kite. November 16, 1929, 14h. 30m.; winds at 10h. 39m.

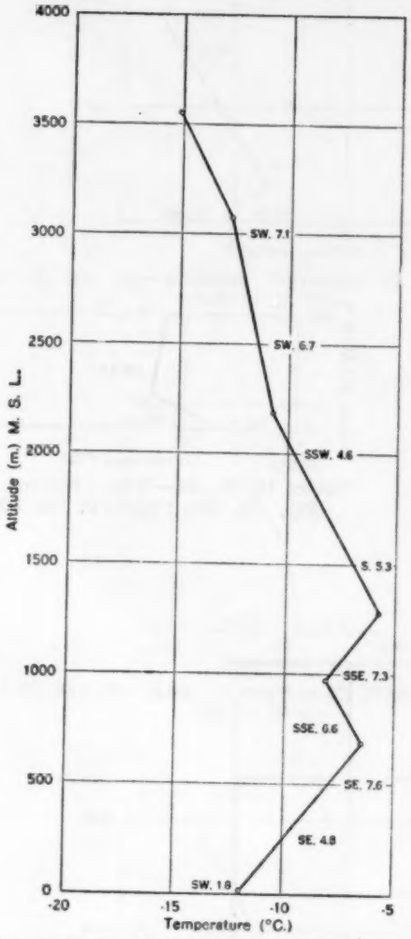

FIGURE 30, No. 28-A.—Airplane. November 17, 1929, 10h. 30m.; winds at 10h. 09m.

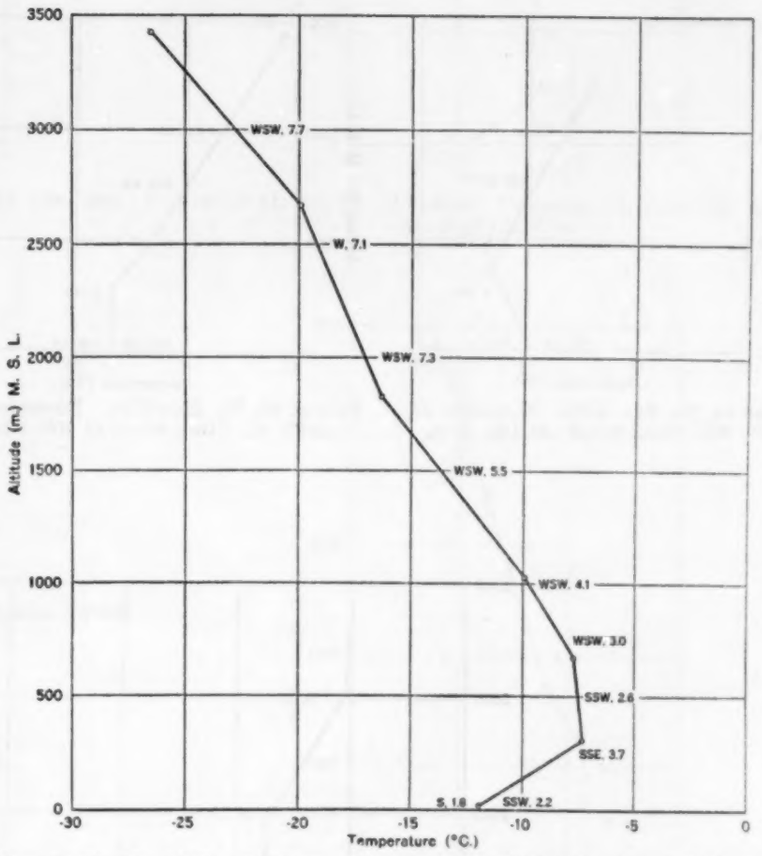

FIGURE 31, No. 28-B.—Airplane. November 23, 1929, 10h. 40m.; winds at 8h. 09m.

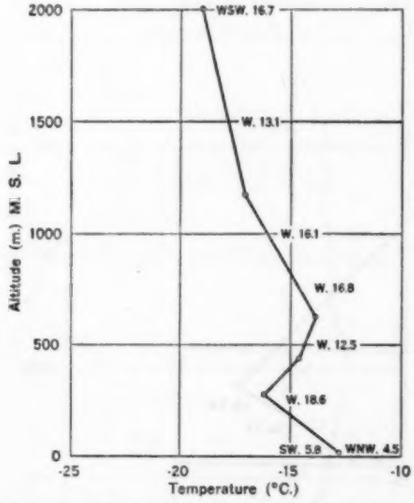

FIGURE 32, No. 29.—Kite. November 25, 1929, 15h. 47m.; winds at 17h. 30m.

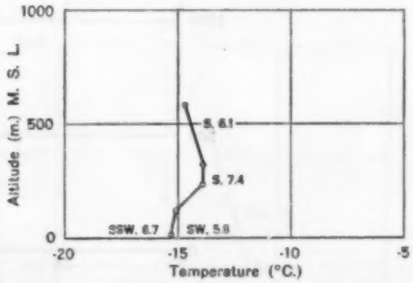

FIGURE 33, No. 30.—Kite. November 26, 1929, 17h. 22m.; winds at 13h. 44m.

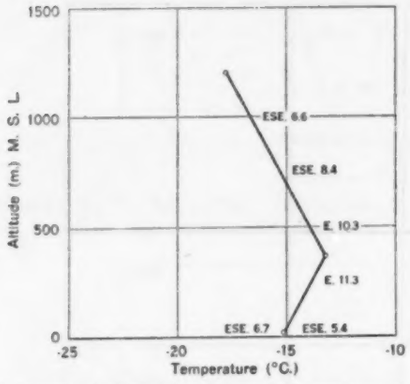

FIGURE 34, No. 31.—Kite. November 27, 1929, 20h. 31m.; winds at 19h. 16m.

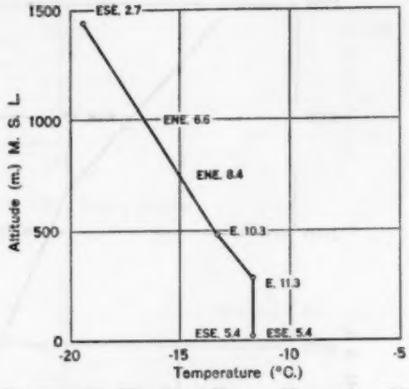

FIGURE 35, No. 32.—Kite. November 28, 1929, 9h. 31m.; winds at 10h. 50m.

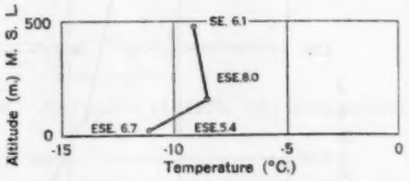

FIGURE 36, No. 33.—Kite. November 28, 1929, 15h. 29m.; winds at 13h. 30m.

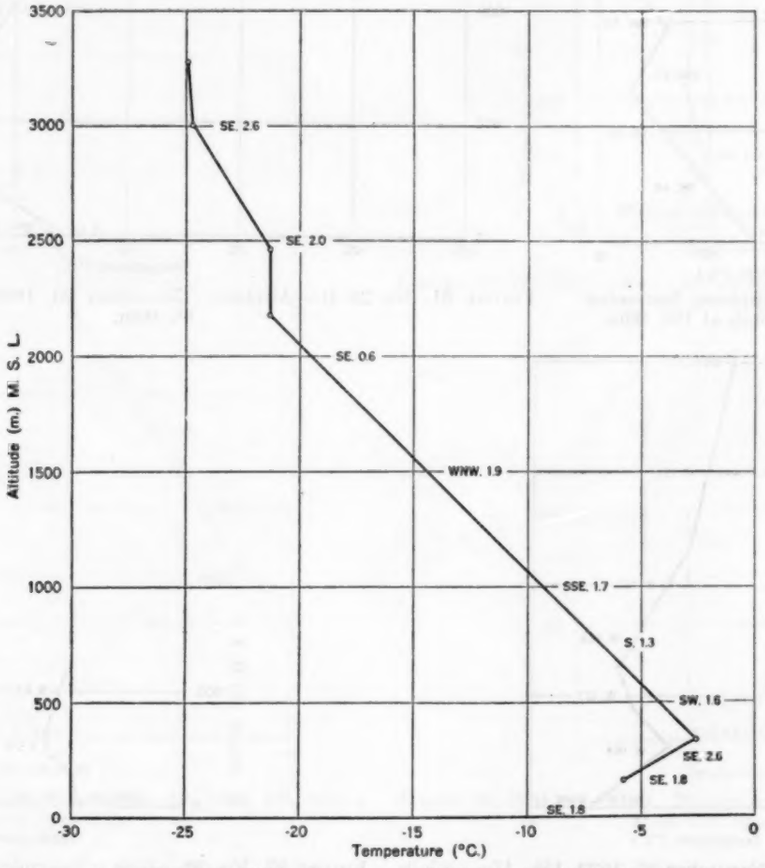

FIGURE 37, No. 34.—Airplane. November 29, 1929, 4h. 45m. at 86°07′ S., 169°12′ W.; winds at 3h. 52m. at Little America.

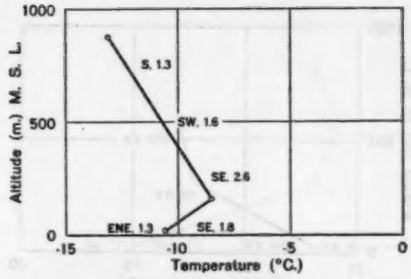

FIGURE 38, No. 35.—Airplane. November 29, 1929, 10h. 09m.; winds at 3h. 52m.

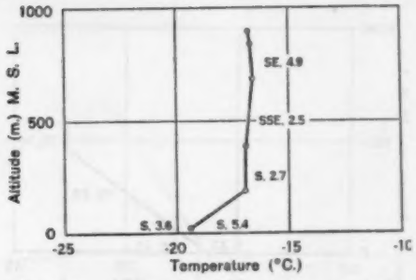

FIGURE 41, No. 38.—Airplane. November 15, 1934, 10h. 58m.; winds at 12h. 47m.

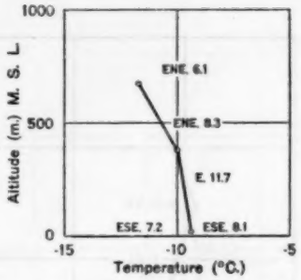

FIGURE 39, No. 36.—Kite. November 30, 1939, 10h. 55m.; winds at 9h. 34m.

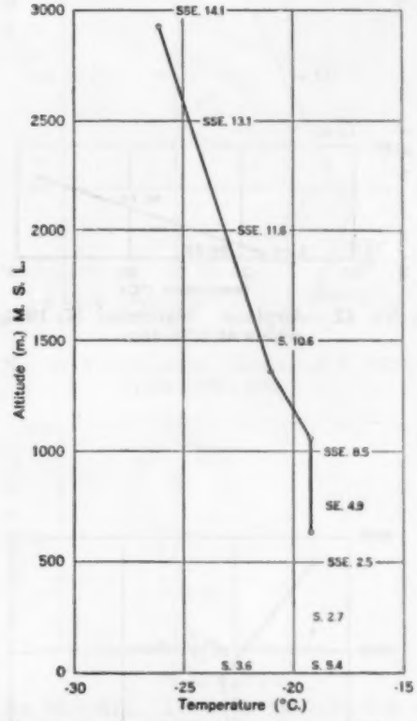

FIGURE 42, No. 39.—Airplane. November 15, 1934, 14h. 27m. at 79°40′ S., 147°00′ W.; winds at 12h. 47m. at Little America.

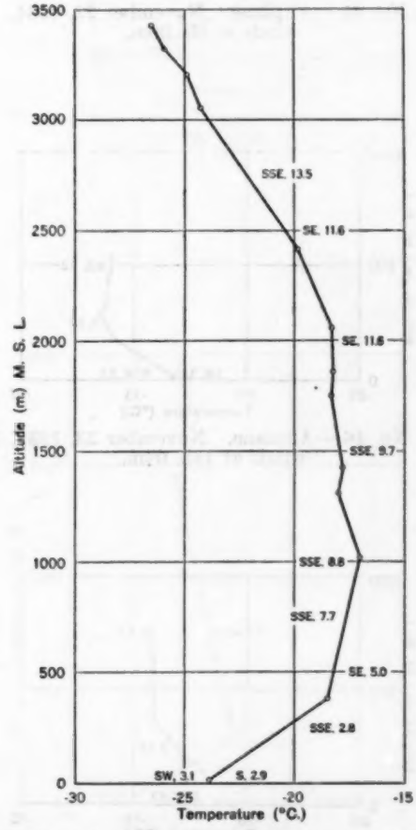

FIGURE 40, No. 37.—Airplane. November 15, 1934, 5h. 49m.; winds at 7h. 58m.

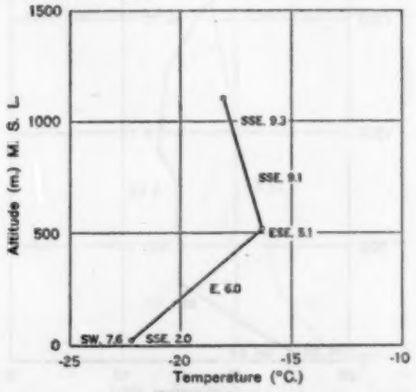

FIGURE 43, No. 40.—Airplane. November 15, 1934, 17h. 50m.; winds at 20h. 15m.

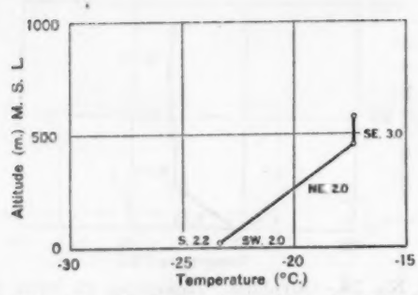

FIGURE 44, No. 41.—Airplane. November 16, 1934, 19h. 31m.; winds at 22h. 45m.

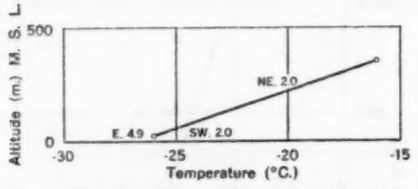

FIGURE 45, No. 42.—Airplane. November 17, 1934, 2h. 16m.; winds at 22h. 45m.

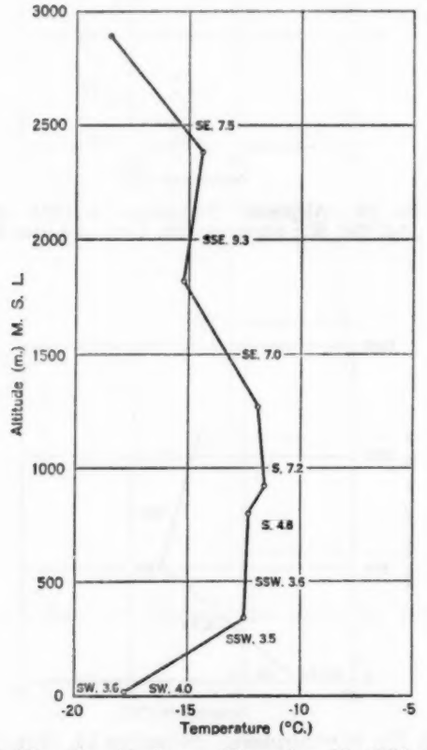

FIGURE 46, No. 43.—Airplane. November 18, 1934, 14h. 35m.; winds at 11h. 37m.

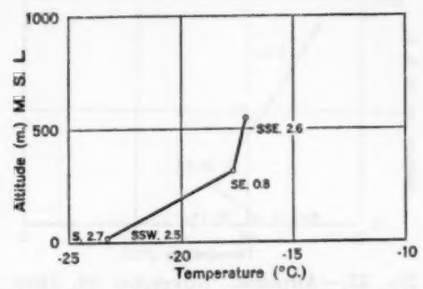

FIGURE 47, No. 44.—Airplane. November 22, 1934, 00h. 03m.; winds at 3h. 48m.

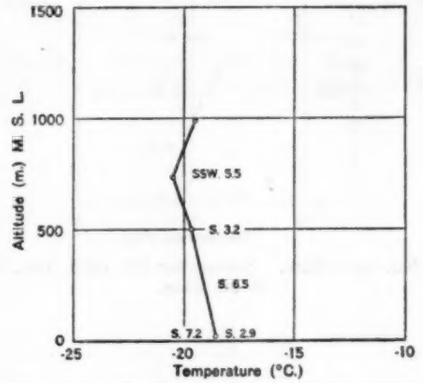

FIGURE 48, No. 45.—Airplane. November 22, 1934, 11h. 08m.; winds at 9h. 00m.

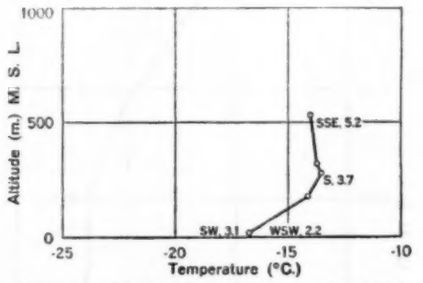

FIGURE 49, No. 46.—Airplane. November 23, 1934, 17h. 16m.; winds at 14h. 04m.

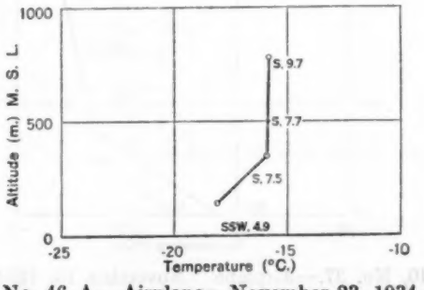

FIGURE 50, No. 46–A.—Airplane. November 23, 1934, 22h. 44m.; winds at 20h. 27m. at Little America.

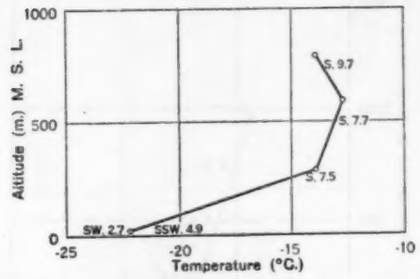

FIGURE 51, No. 47.—Airplane. November 24, 1934, 00h. 56m.; winds at 20h. 27m.

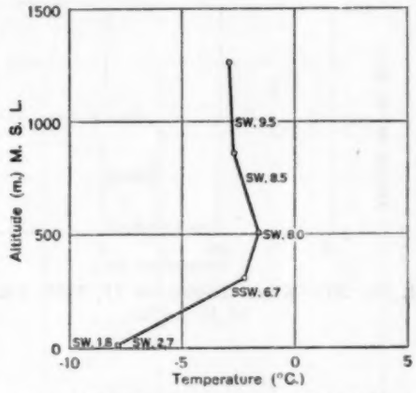

FIGURE 52, No. 48.—Airplane. December 5, 1929, 10h. 50m.; winds at 9h. 08m.

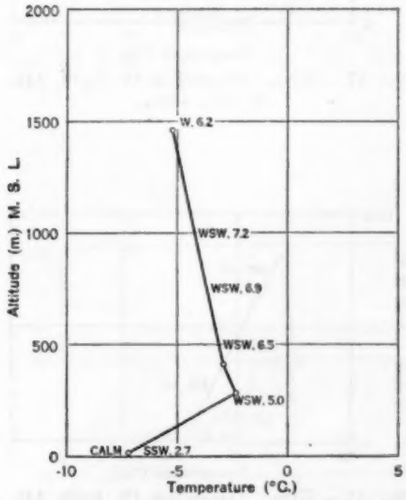

FIGURE 53, No. 49.—Airplane. December 5, 1929, 18h. 42m.; winds at 21h. 36m.

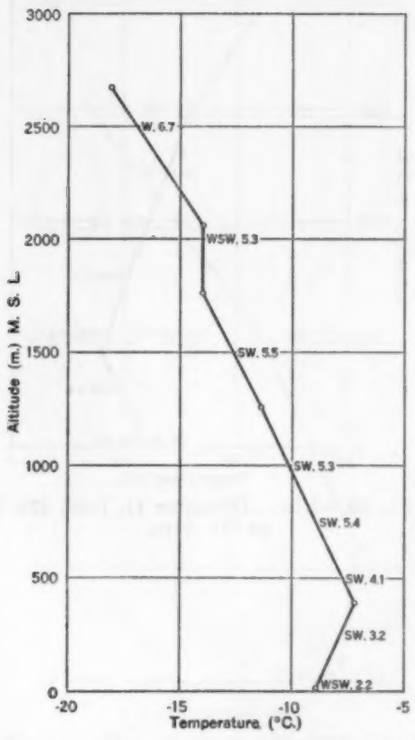

FIGURE 54, No. 49-A.—Airplane. December 7, 1929, 11h. 31m.; winds at 9h. 00m.

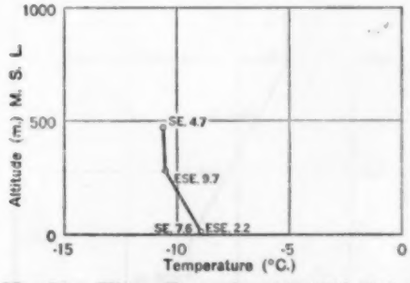

FIGURE 55, No. 50.—Kite. December 10, 1929, 21h. 06m.; winds at 15h. 43m.

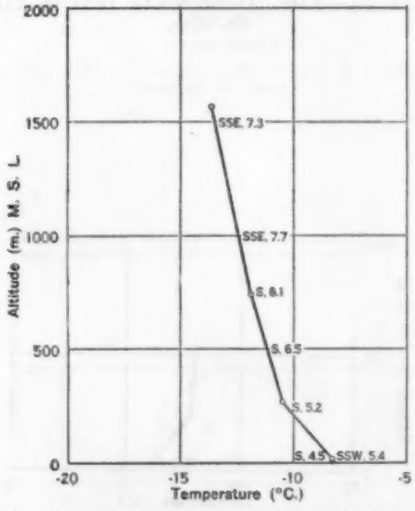

FIGURE 56, No. 51.—Kite. December 11, 1929, 10h. 09m.; winds at 11h. 23m.

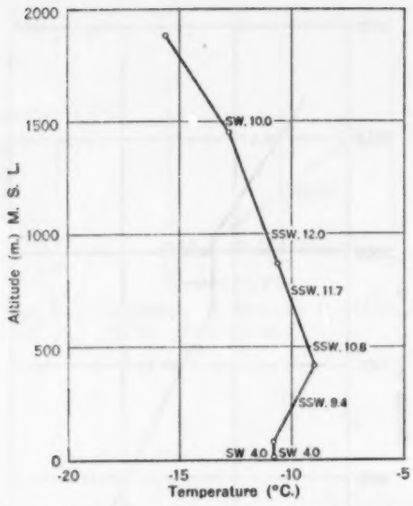

FIGURE 57, No. 52.—Kite. December 11, 1929, 23h. 08m.; winds at 21h. 51m.

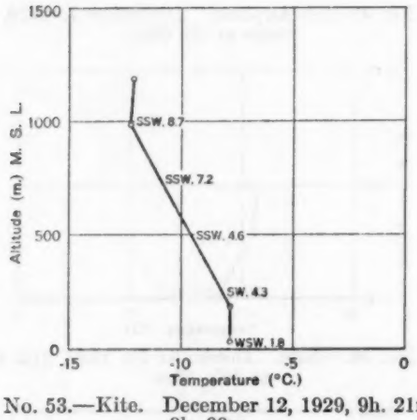

FIGURE 58, No. 53.—Kite. December 12, 1929, 9h. 21m.; winds at 9h. 00m.

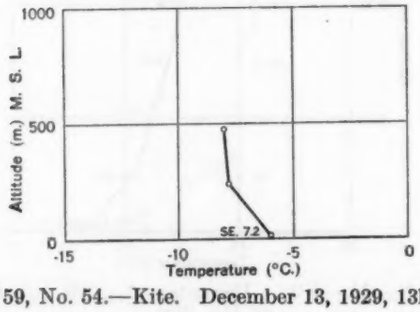

FIGURE 59, No. 54.—Kite. December 13, 1929, 13h. 00m.

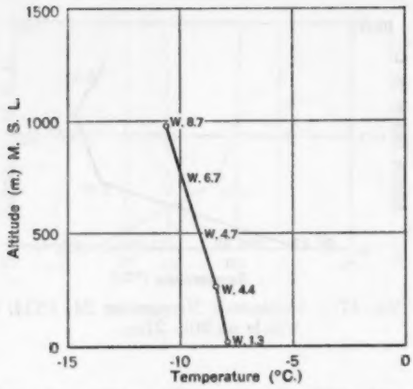

FIGURE 60, No. 55.—Kite. December 15, 1929, 10h. 02m.; winds at 18h. 10m.

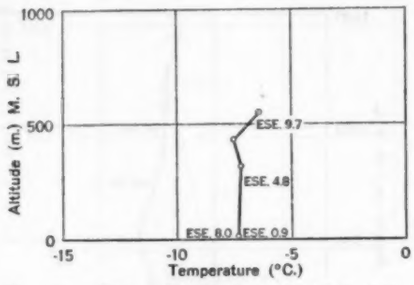

FIGURE 61, No. 56.—Kite. December 17, 1929, 14h. 44m.; winds at 10h. 46m.

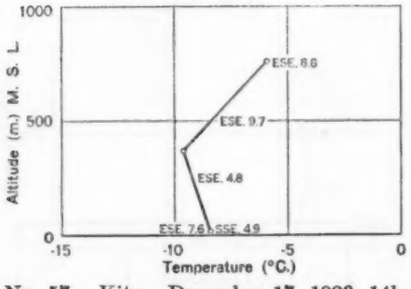

FIGURE 62, No. 57.—Kite. December 17, 1929, 14h. 44m.; winds at 10h. 46m.

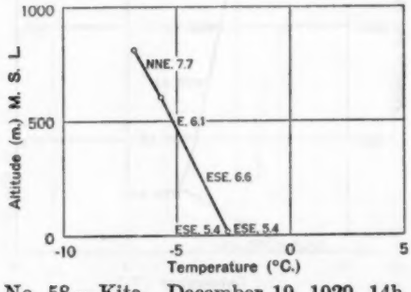

FIGURE 63, No. 58.—Kite. December 19, 1929, 14h. 40m.; winds at 13h. 47m.

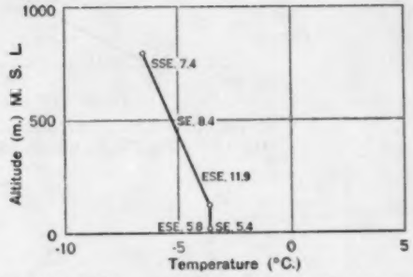

FIGURE 64, No. 59.—Kite. December 19, 1929, 19h. 34m.; winds at 21h. 30m.

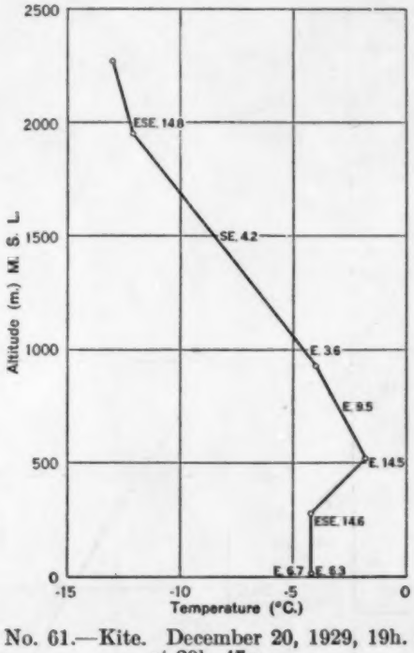

FIGURE 66, No. 61.—Kite. December 20, 1929, 19h. 45m.; winds at 20h. 47m.

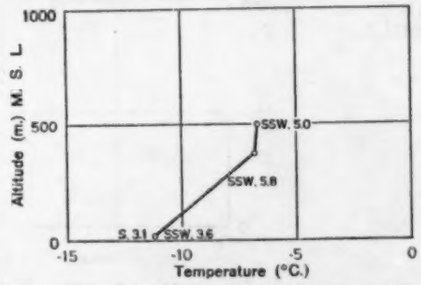

FIGURE 68, No. 63.—Airplane. December 8, 1934, 13h. 23m.; winds at 15h. 05m.

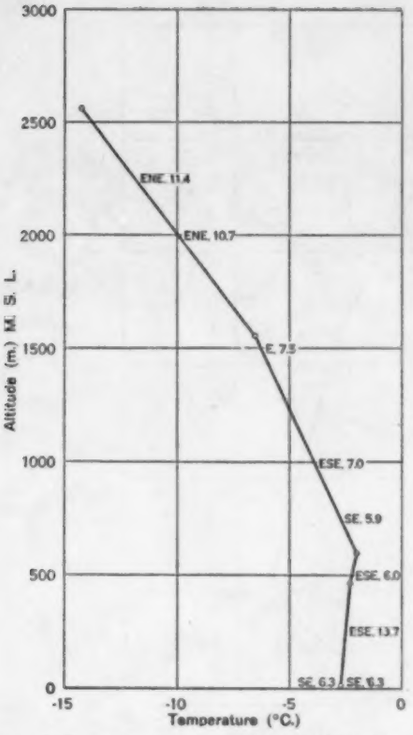

FIGURE 65, No. 60.—Kite. December 20, 1929, 10h. 31m.; winds at 9h. 32m.

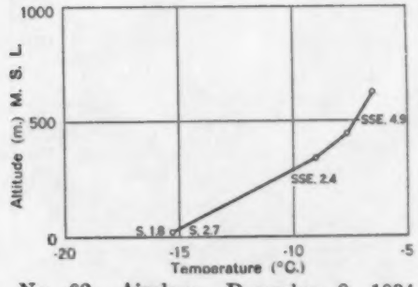

FIGURE 67, No. 62.—Airplane. December 8, 1934, 2h. 40m.; winds at 9h. 20m.

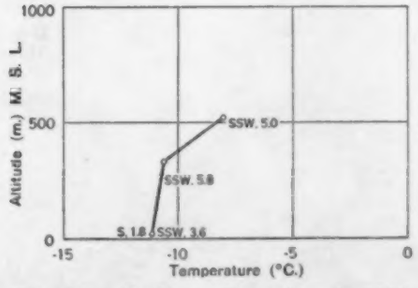

FIGURE 69, No. 64.—Airplane. December 8, 1934, 17h. 15m.; winds at 15h. 05m.

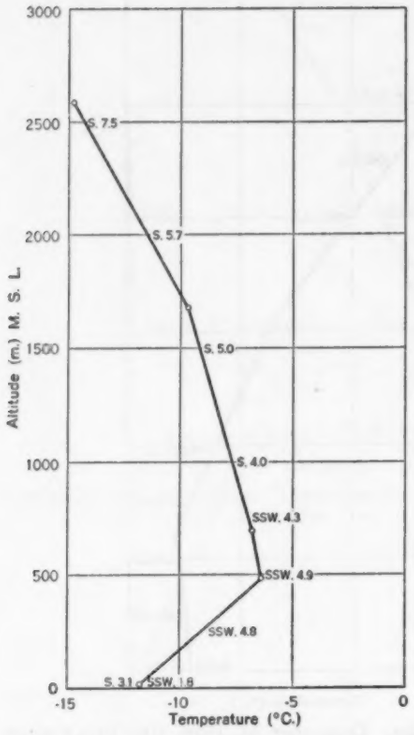

FIGURE 70, No. 65.—Airplane. December 15, 1934, 15h. 40 m.; winds at 16h. 54m.

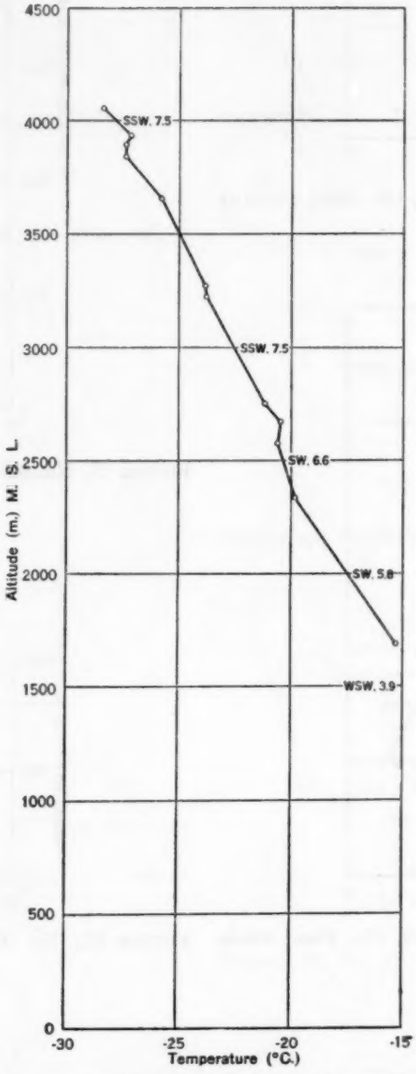

FIGURE 71, No. 66.—Airplane. December 15, 1934, 22h. 05m.; 76°37′ S., 151°15′ W.—75°54′ S., 146°52′ W.; winds on December 16, 1934 at 0h. 15m. at Little America

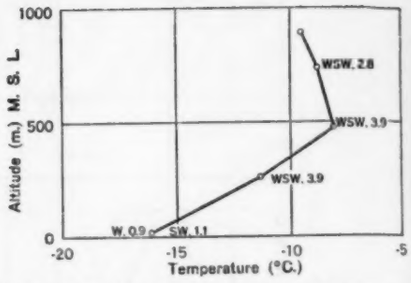

FIGURE 72, No. 67.—Airplane. December 16, 1934, 3h. 20m.; winds at 0h. 15m.

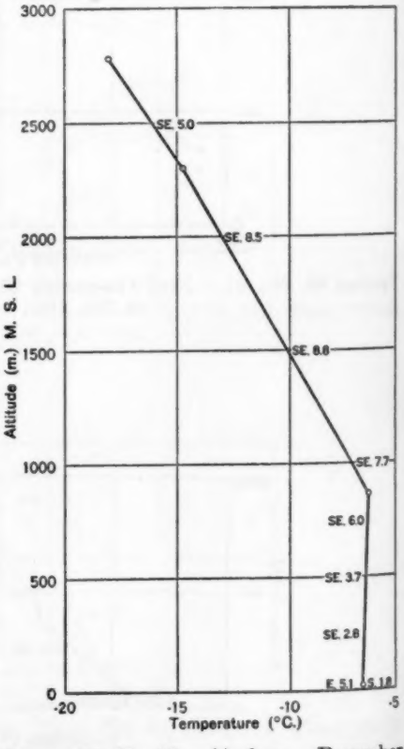

FIGURE 73, No. 68.—Airplane. December 27, 1934, 11h. 05m.; winds at 8h. 35m.

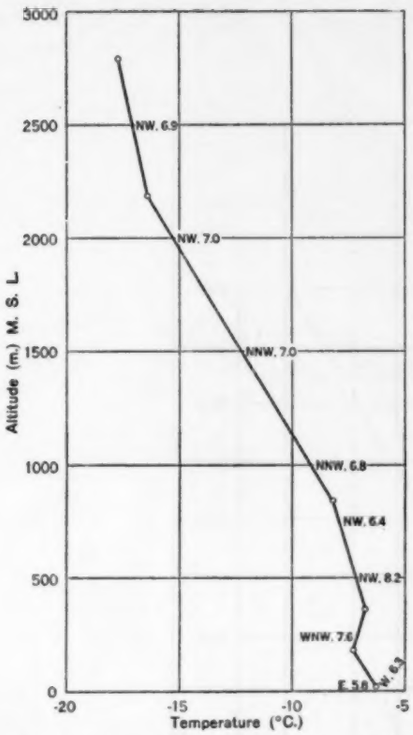

FIGURE 74, No. 69.—Airplane. December 27, 1934, 14h. 29m.; winds at 13h. 20m.

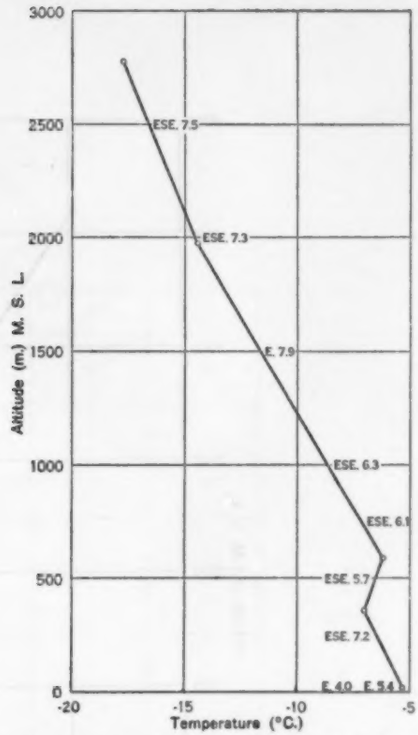

FIGURE 75, No. 70.—Airplane. December 28, 1934, 10h. 22m.; winds at 8h. 10m.

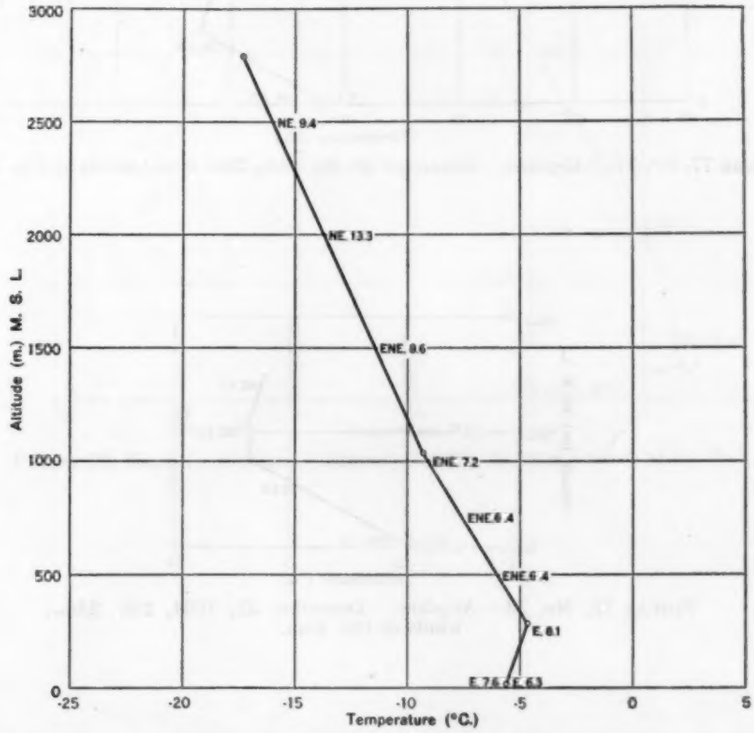

FIGURE 76, No. 71.—Airplane. December 28, 1934, 13h. 16m.; winds at 13h. 08m.

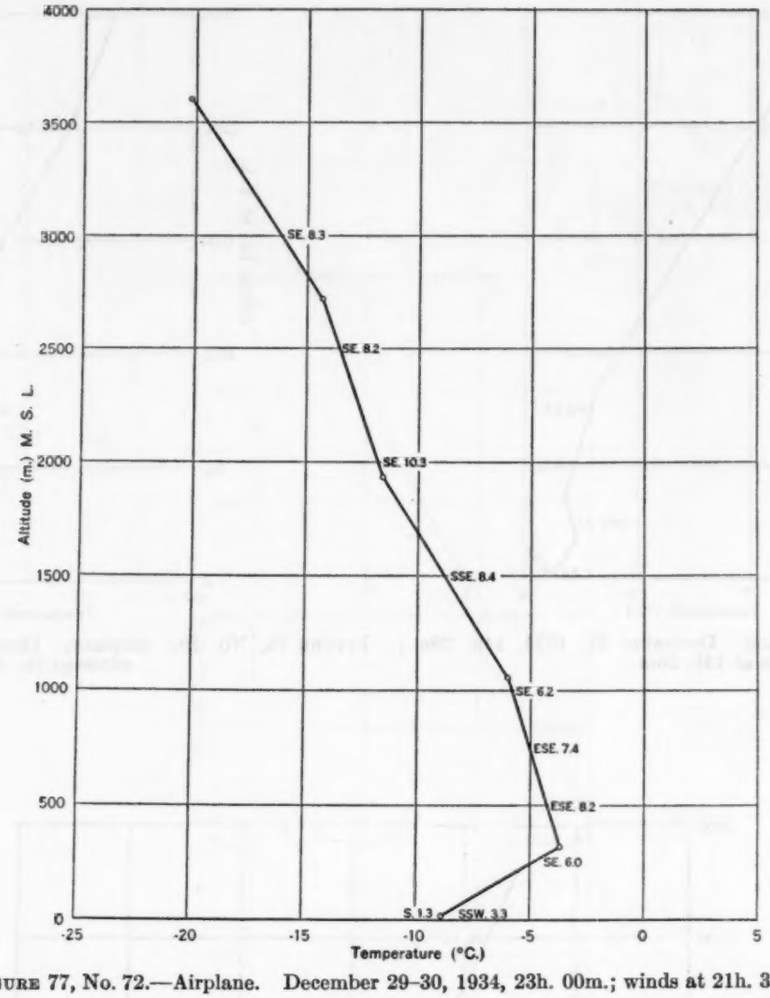

FIGURE 77, No. 72.—Airplane. December 29–30, 1934, 23h. 00m.; winds at 21h. 30m.

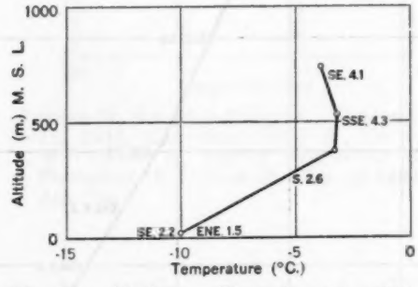

FIGURE 78, No. 73.—Airplane. December 31, 1934, 22h. 24m.; winds at 19h. 05m.

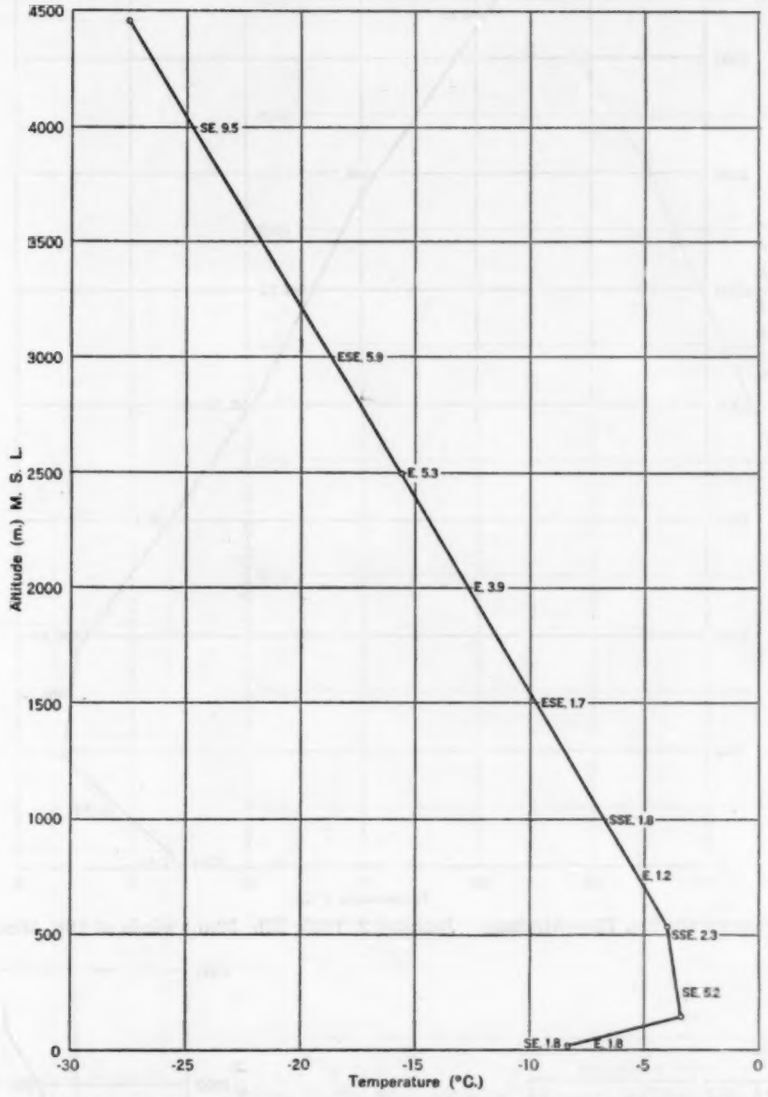

FIGURE 79, No. 74.—Airplane. January 1, 1935, 6h. 01m.; winds at 2h. 35m.

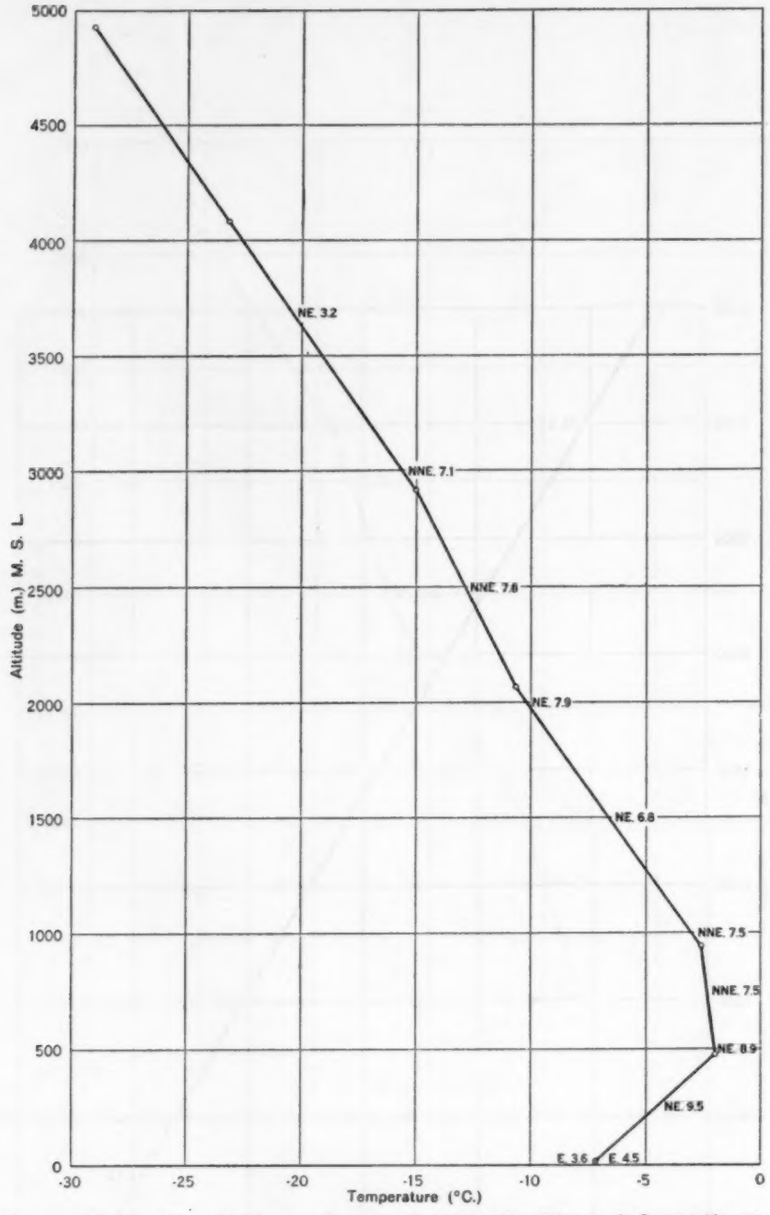

FIGURE 80, No. 75.—Airplane. January 2, 1935, 22h. 32m.; winds at 19h. 50m.

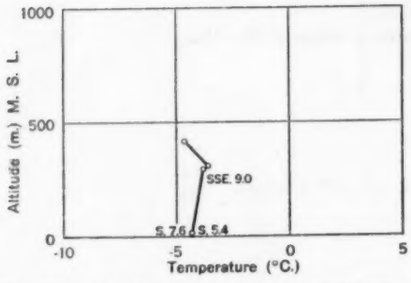

FIGURE 81, No. 76.—Airplane. January 5, 1935, 19h. 10m.; winds at 20h. 55m.

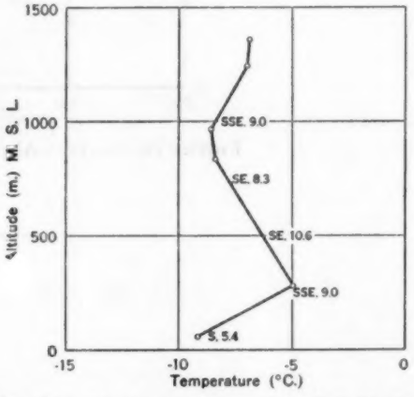

FIGURE 82, No. 77.—Airplane. January 6, 1935, 1h. 06m.; winds at 20h. 55m.

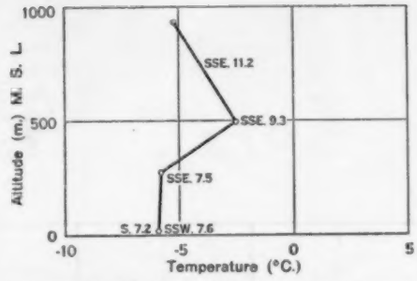

FIGURE 83, No. 78.—Airplane. January 6, 1935, 19h. 20m.; winds at 15h. 58m.

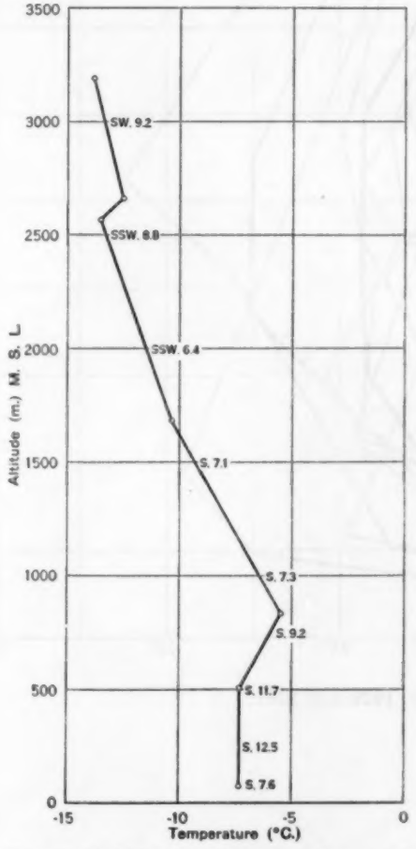

FIGURE 84, No. 79.—Airplane. January 6, 1935; 21h. 54m.; winds at 21h. 38m.

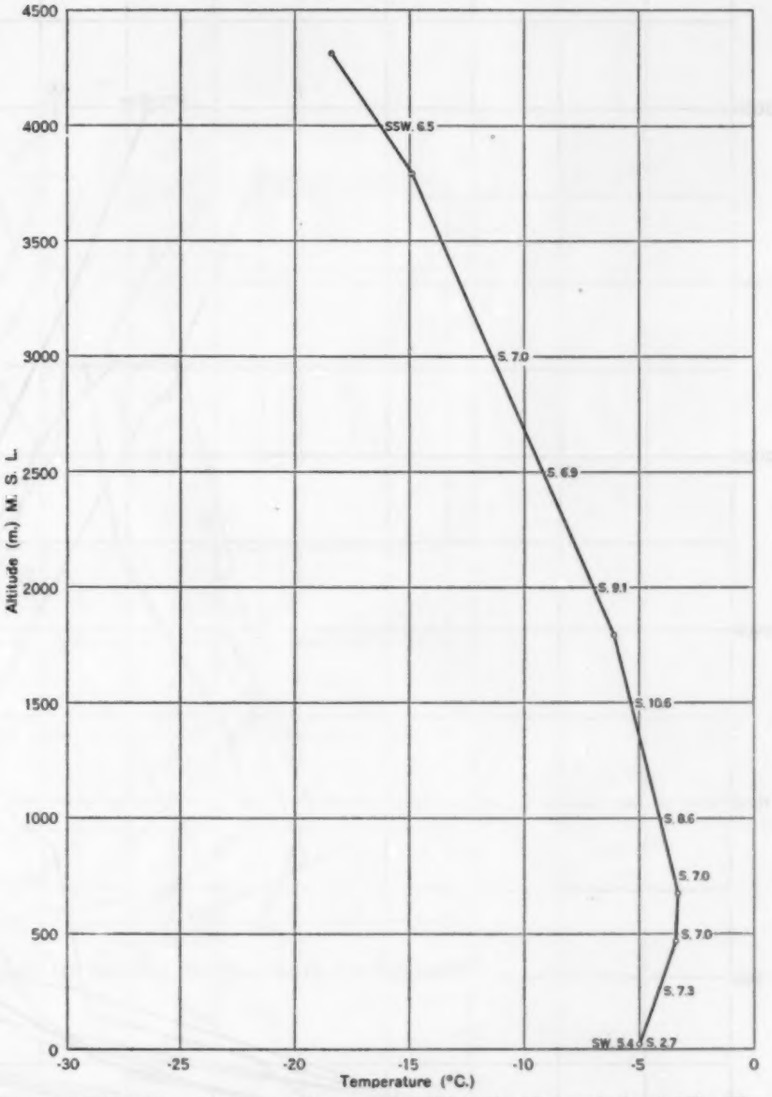

FIGURE 85, No. 80.—Airplane. January 9, 1935; 15h. 45m.; winds at 18h. 23m.

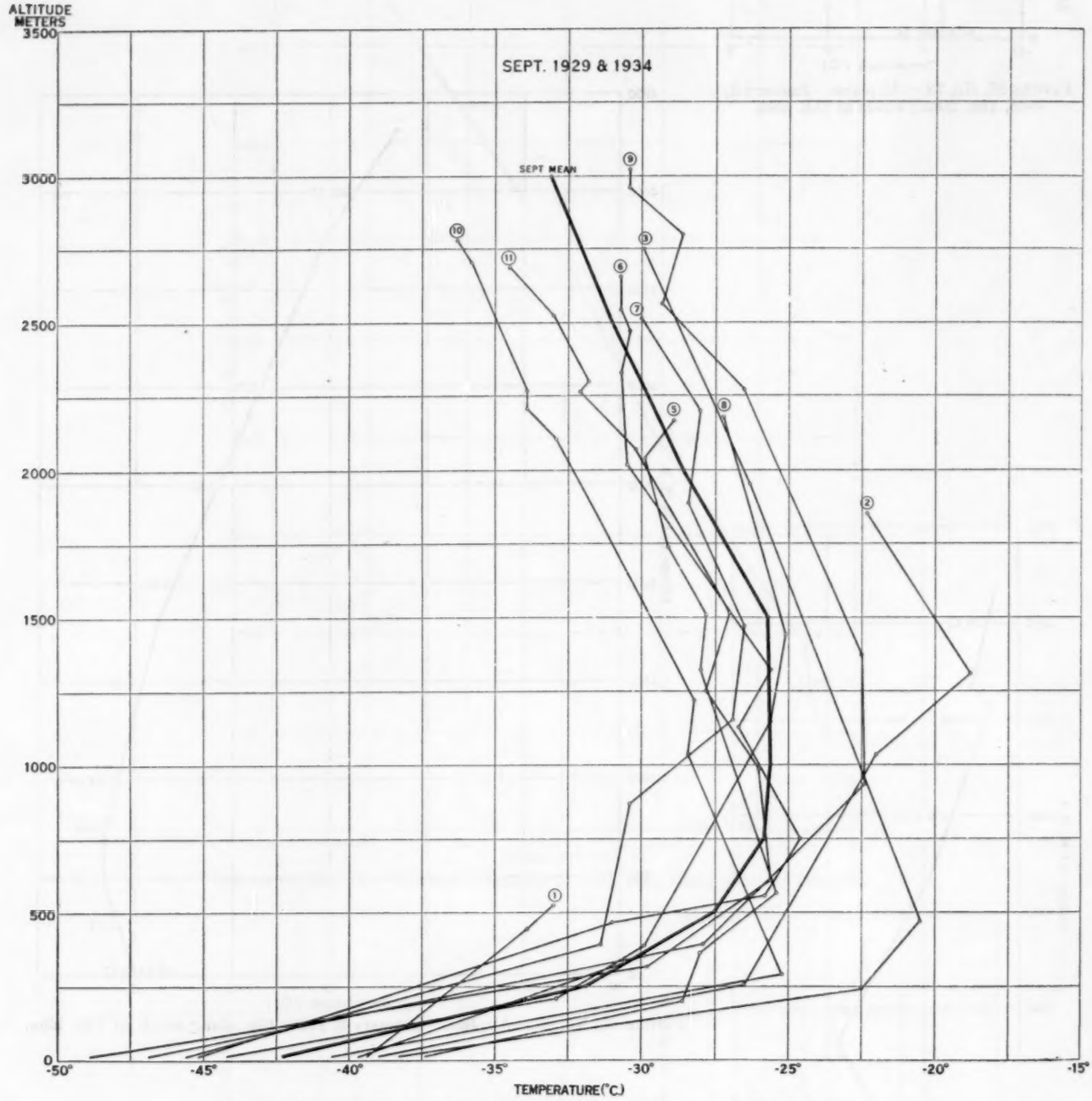

FIGURE 86.—Vertical temperature distribution in September, 1929 and 1934.

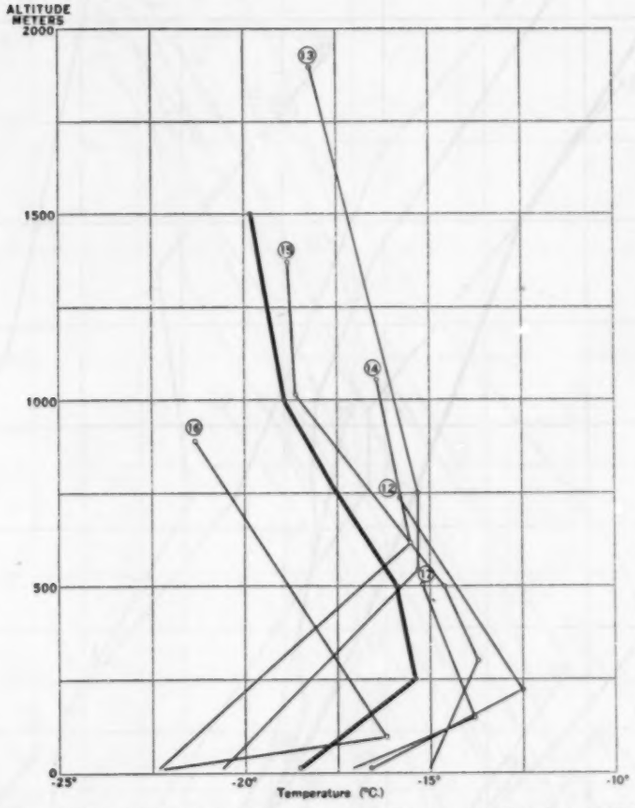

FIGURE 87.—Vertical temperature distribution in October, 1929.

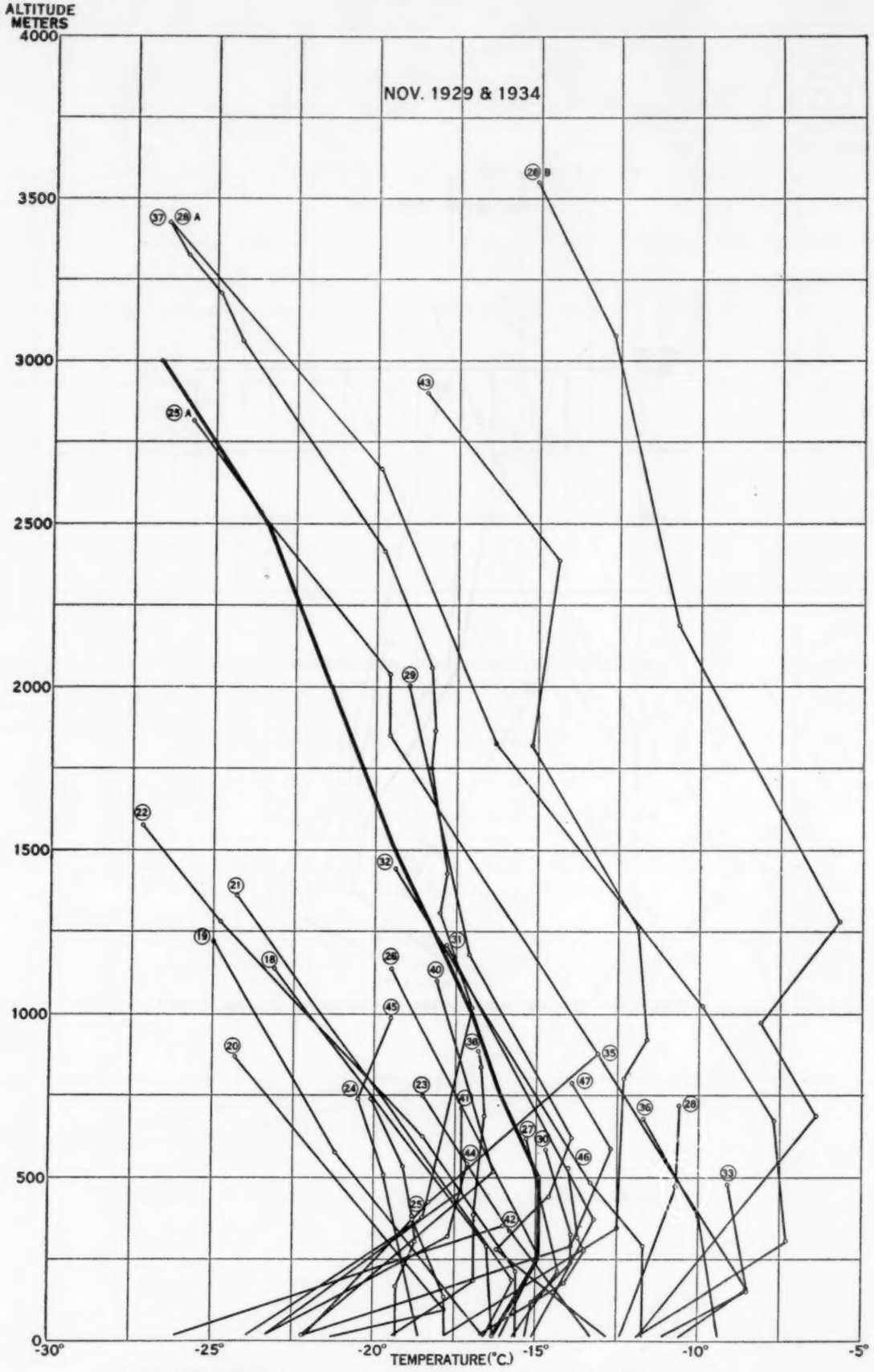

FIGURE 88.—Vertical temperature distribution in November, 1929 and 1934.

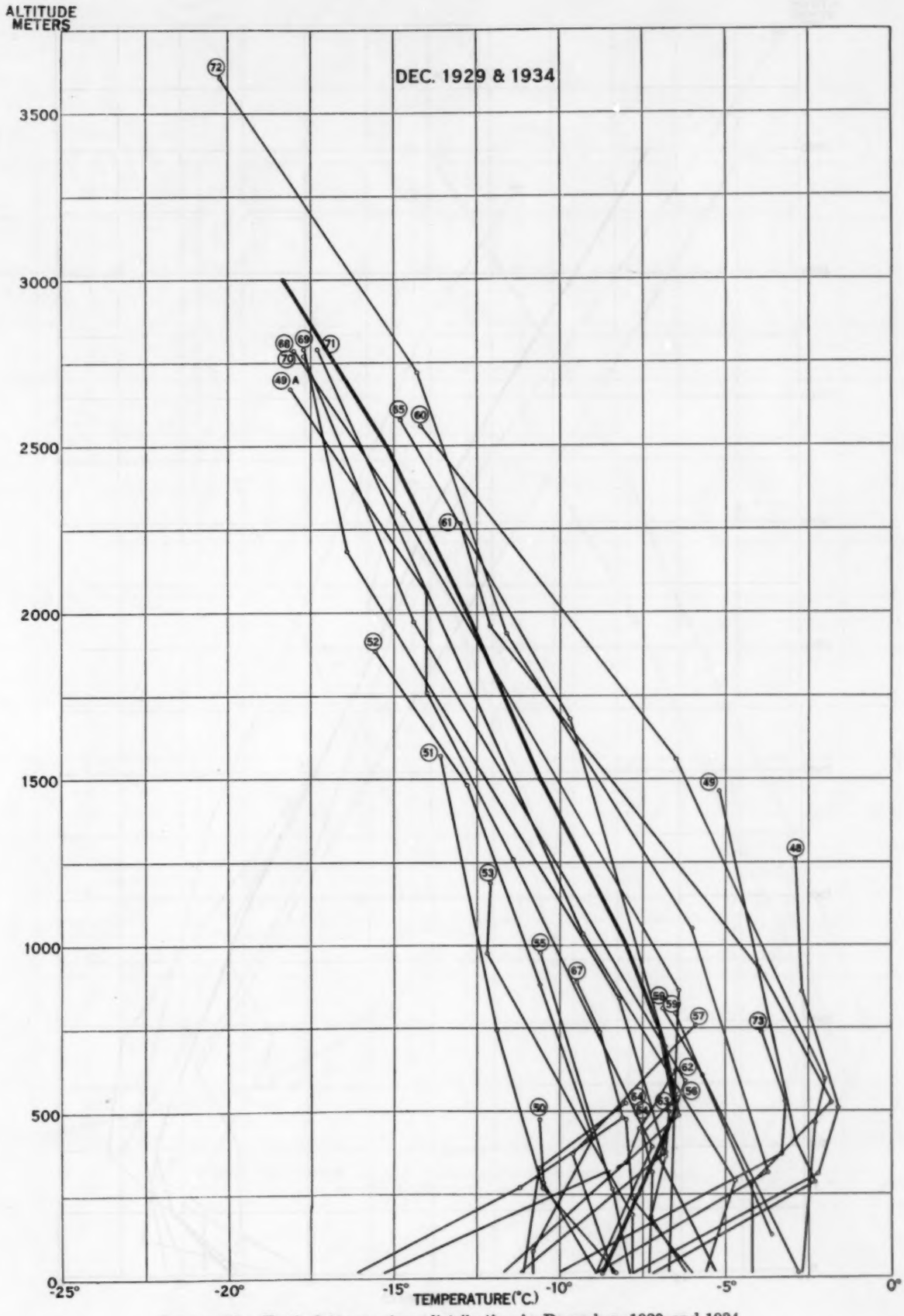

FIGURE 89.—Vertical temperature distribution in December, 1929 and 1934.

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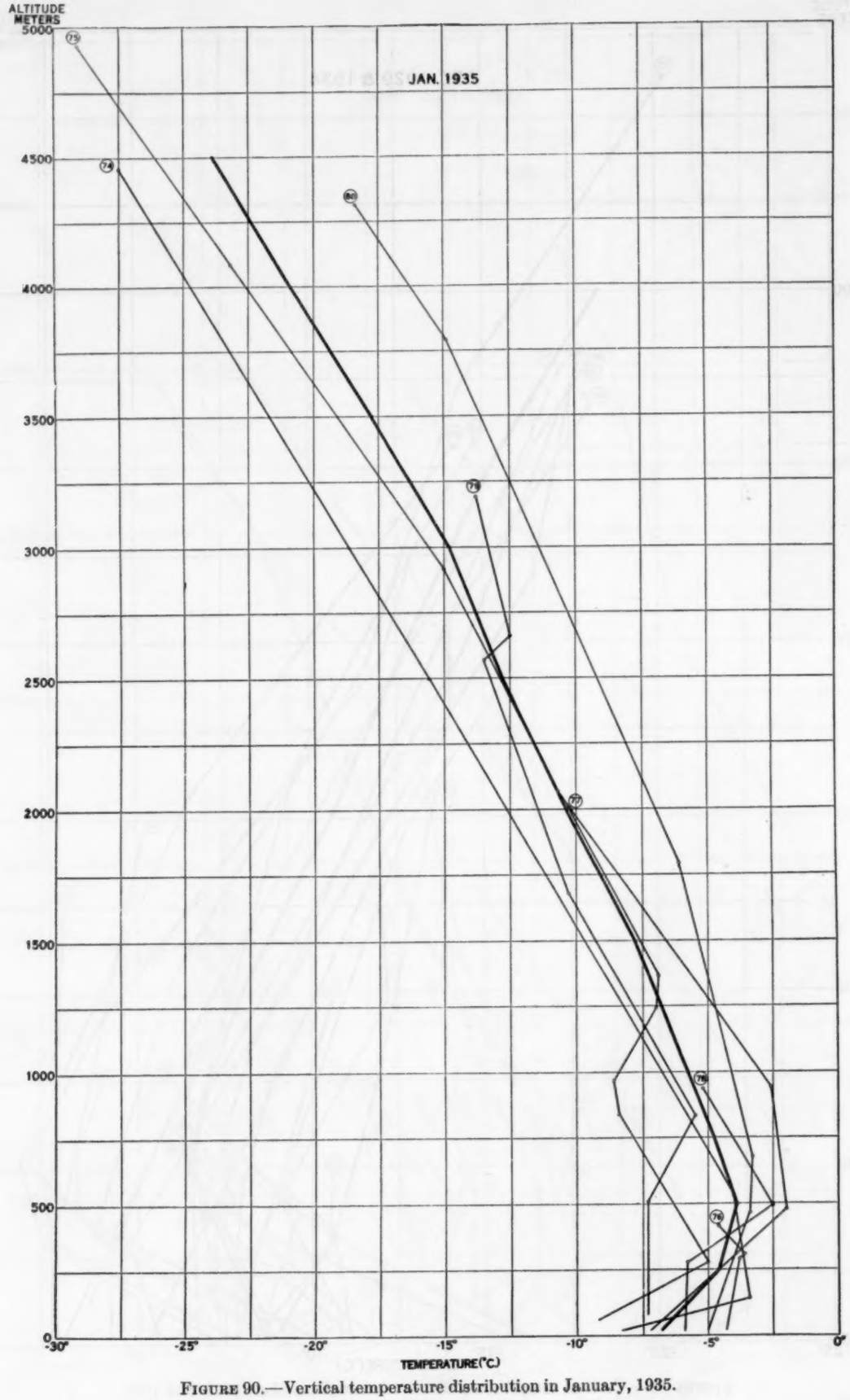

FIGURE 90.—Vertical temperature distribution in January, 1935.

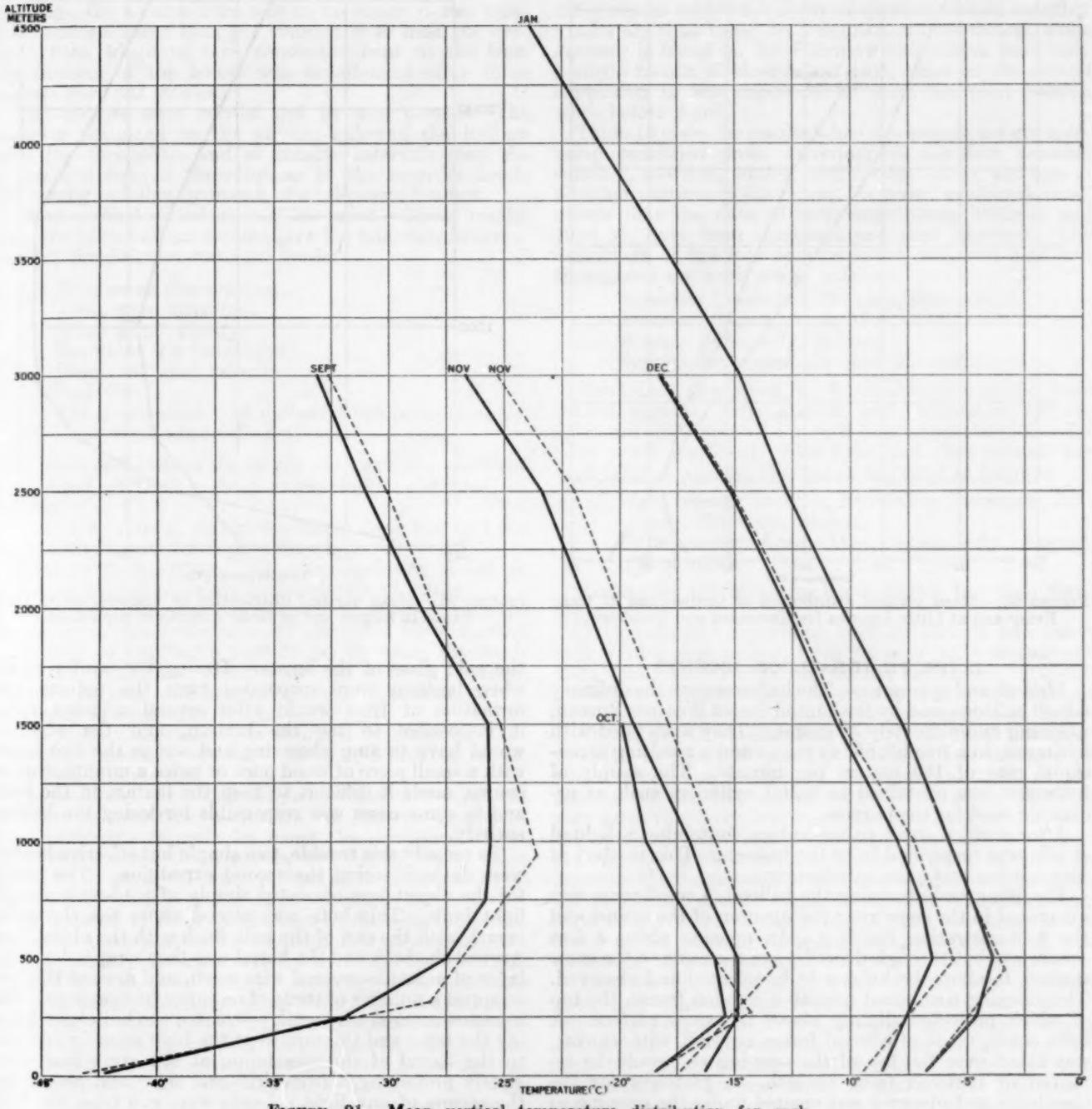

FIGURE 91.—Mean vertical temperature distribution for each month, September–January.

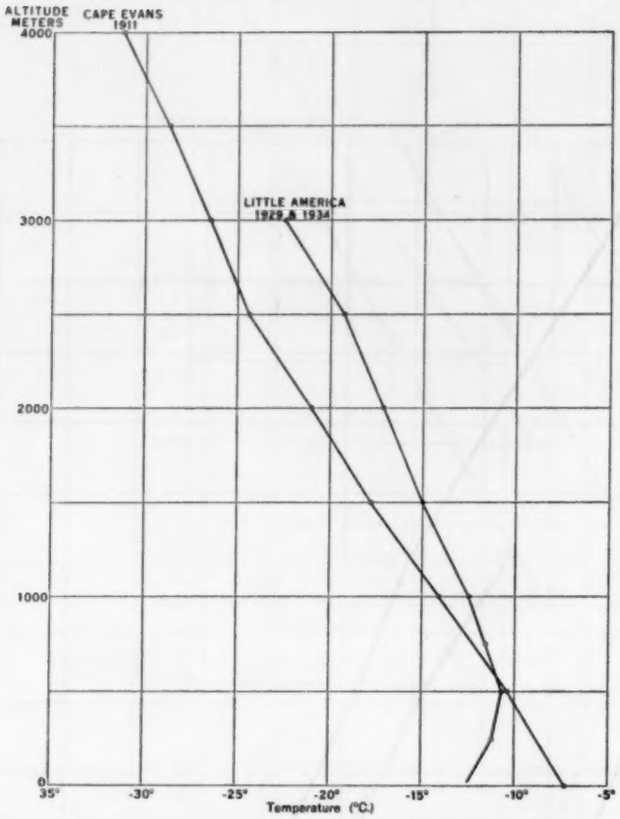

FIGURE 95.—Mean vertical distribution of temperature at Cape Evans and at Little America for November and December.

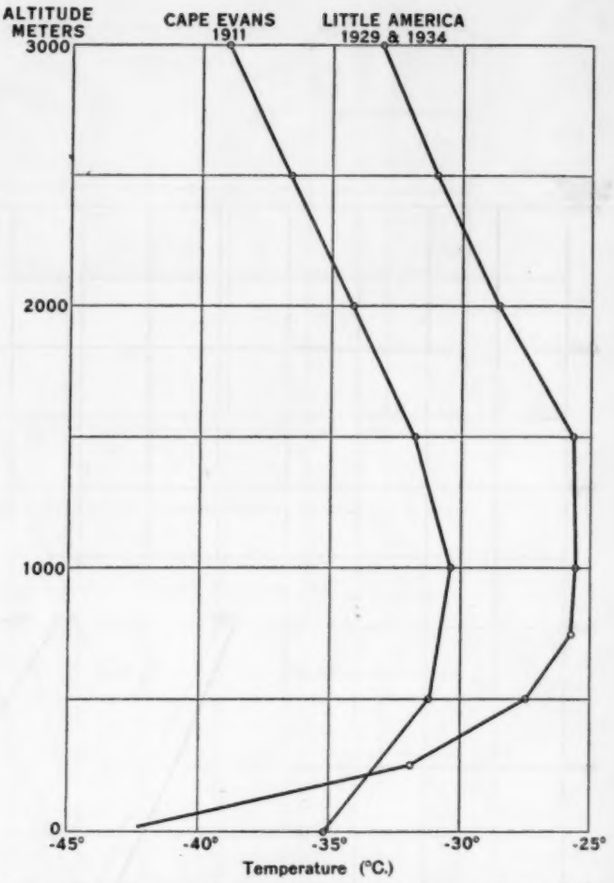

FIGURE 96.—Mean vertical distribution of temperature of Cape Evans in August and at Little America in September.

2. THE PILOT-BALLOON ASCENTS

Methods and apparatus.—The balloons were the ordinary 6-inch balloons used by the United States Weather Bureau, weighing approximately 30 grams. They were filled with hydrogen, to a free lift of 140 grams and a resulting ascensional rate of 180 meters per minute. The supply of hydrogen was contained in metal cylinders such as ordinarily used for the purpose.

After dark, a small paper-lantern containing a lighted candle was suspended from the balloon. This method of illumination was quite satisfactory.

For filling and observing the balloon, a small room was excavated in the snow near the junction of the tunnel and the Administration Building. An opening about 5 feet square was cut through the ceiling of the room to the snow surface, to allow the balloon to be released and observed. This opening was boxed in with a wooden frame, the top of which projected slightly above the snow surface. A light cover, made of a wood frame covered with canvas, was fitted over the top of the opening and could be removed or replaced from beneath. A platform for the theodolite and observer was erected under the opening so as to bring the theodolite telescope level with the top of the frame.

Considerable difficulty was experienced on the first expedition by the formation of frost on the theodolite lenses while the pilot balloon was being observed, especially in the colder weather when the vapor in the observer's breath and probably also the moisture from his face condensed on the cold glass of the lenses. During the winter night, when lanterns were suspended from the balloon this formation of frost would after several minutes make it impossible to see the lantern, and the observer would have to stop observing and scrape the two lenses with a small piece of wood once or twice a minute; this, of course, made it difficult to keep the lantern in the field, and in some cases was responsible for losing the balloon entirely.

To remedy this trouble, two simple but effective heaters were devised during the second expedition. The heater for the object lens consisted simply of a 15-watt electric light bulb. This bulb was placed under the theodolite barrel, with the end of the bulb flush with the object lens. Around the bulb and the barrel was then wrapped a single layer of asbestos-covered wire mesh, and around this was wrapped a number of turns of ordinary friction tape. The asbestos-covered wire mesh prevented the bulb from burning the tape, and the tape kept the bulb securely fastened to the barrel of the theodolite, at the same time completely protecting it from drift and snow and preventing the escape of any light. Leads were run from the bulb socket to the building nearby and tapped into a 110-volt line. The heat from the lighted bulb heated the end of the theodolite barrel near the objective, and this in turn heated the lens by conduction, preventing any frost formation whatever.

This type of device was too bulky for the eyepiece and would not give the observer an unobstructed view of

the theodolite scales; hence, a resistance type heater was used here. It consisted of a piece about three-fourths of an inch long cut from a resistance unit made of resistance wire wound on a ceramic tube. With a little filing of the inside of a tube, it was easily made to fit on over the eyepiece. Leads were run from this resistor into the building where they were connected to a 6-volt storage battery. Although the ceramic tube was an insulator, it was quite thin, and sufficient heat got through it to heat the eyepiece tube which in turn conducted heat to the lens. No frosting of the lenses was experienced after these heaters were put into use.

The ascents were carried out by two persons: The observer stationed on the outside followed the balloon with the theodolite, and at minute intervals read the angles and relayed these figures to the recorder inside the nearby building by means of a telephone headset.

Mean vertical distribution of the wind.—Mean results from the pilot-balloon ascents give the following information for the different standard levels:

Number of observations.
Mean wind direction.
Mean wind velocity.
Resultant wind direction.
Resultant wind velocity.
Stability.
The north-south and east-west components of the resultant wind velocity.

In some cases where the ascent did not quite reach the next standard level a short extrapolation was used, as follows:

From 0 to 750 m., no extrapolation; from 990 to 3,000 m., extrapolation of 110 m. allowed.

From 3,000 to 5,000 m., allow extrapolation of 180 m.

For over 5,000 m., allow extrapolation of 250 m.

The mean wind direction, sometimes referred to as the frequency-resultant direction, is computed by a method equivalent to Lambert's formula (4) by using directions from the individual ascents to the nearest sixteenth compass division and weighting these according to the frequency of their occurrence.

The mean wind velocity is obtained by computing the arithmetic mean of all the velocities, including calms, regardless of direction.

The resultant wind direction, sometimes also called the direction of resultant movement, is likewise computed from Lambert's formula by using the directions of the individual ascents to 16 points, but by weighting these according to their velocities instead of their frequency as in the computation of the mean direction.

The resultant velocity is obtained by dividing the resultant wind movement by the total number of observations.

The stability is computed by dividing the resultant velocity by the mean velocity and expressing this ratio as a percentage; this figure gives some indication as to the steadiness of the wind. Thus, if the winds were equally distributed among the different directions and also had the same velocities, the resultant velocity and hence the stability would be zero. On the other hand, if the winds blew constantly from the same direction, the resultant and mean velocities would be the same and the stability would have a value of 100.

For the north-south components of the resultant wind velocity, a plus sign indicates that the component is from the north and a minus sign that it is from the south; for the east-west components, the plus sign indicates that the component is from the west and a minus sign that it is from the east.

The results of the pilot-balloon ascents for the individual months are given in table 11A, and the results by months, when the data of both expeditions are combined, are given in table 12. Most of these combined monthly results are thus based on 2 months of observation, while January is based on 3. February and March have only a single month of observation each, since on the second expedition it was impossible to start the pilot balloon work before April.

Table 13 gives the results when the ascents are grouped, using combined data, according to the four seasons, summer, autumn, winter, and spring. Here, and also in all other portions of the report, the term "combined data" means that the data of both expeditions, 1929–30 and 1934–35, have been combined and used together. The definitions of the four seasons which are used here and throughout the work are as follows:

Summer: December, January, February.
Autumn: March, April, May.
Winter: June, July, August.
Spring: September, October, November.

Results are also given for the combination of the three coldest months, July, August, and September; for the light and dark season; for each year separately; and for both years combined. The light and dark seasons are each taken to consist of a 6-month period as follows:

Light season: October, November, December, January, February, March.
Dark season: April, May, June, July, August, September.

Results are not given for levels having less than three observations.

During the first expedition, 1928–30, ascents were made over a 13-month period, from January 1929 to January 1930, inclusive. During the second expedition, 1933–35, ascents were made during 10 months, from April 1934 to January 1935, inclusive. A few ascents made in February 1930, March 1934, and February 1935, have not been included in tables 12 and 13, but are used in table 14 which gives the mean and maximum altitude of the ascents for the different months. These mean altitudes may seem relatively low, but it must be remembered that they include many ascents in which the balloon entered low clouds, a circumstance which is quite effective in lowering the mean values. Mean altitudes are also given for only those ascents made during clear weather; these, of course, are considerably higher than the mean value based on all ascents. The highest altitude reached was 13,950 m. on September 17, 1934.

All of the results in tables 11A, 12, and 13 are directly computed mean values; no attempt has been made to use any kind of difference method even though the decrease in the number of observations at the higher levels would probably justify something of this kind. The results in table 13 are shown graphically in figures 97 to 106, which give curves for the vertical distribution of the resultant and mean velocity, and the resultant and mean direction.

That the decrease in the east component in the cold season is real, and not the result of having made the pilot-balloon ascents during particular weather types, is sub-

stantiated by the results of the hourly surface-wind observations given in the following table:

Mean surface wind direction

	Summer	Winter	3 coldest months
From hourly values	S.50°E	S.11°E	S.7°W
From pilot-balloon ascents	S.26°E	S.5°E	S.16°W

The *mean* direction, as computed from the hourly values, shows the decrease in the east component from summer to winter and also the absence of any east component during the 3 coldest months. In the second row, for comparison, there is given the *mean* surface direction computed from the pilot-balloon ascents, which are in substantial agreement with the results from the hourly values.

In the last column of the table containing the pilot-balloon results from all observations of both expeditions, is given the difference between the mean direction and the resultant direction, the positive sign indicating that the mean direction is in advance of the resultant direction in the sense of a clockwise rotation; the greatest difference occurs at 8 km., the approximate level of the tropopause, whereas the minimum stability occurs at 4 and 5 km.

The percentage frequencies of the different wind directions at the standard levels for the different seasons are entered in table 15. The bottom row of the table giving the annual average contains the frequencies as computed from the hourly values of the surface wind direction, and has been added in order to show by a comparison of the two sets of surface values how well the pilot-balloon ascents represent average conditions. Corresponding curves are shown in figure 115. The smaller percentage of east winds with the ascents is the result of the fact that the wind from this direction was often accompanied by snow and drift, making a balloon ascent impossible. The higher percentage of southwest winds is, no doubt, due to the fact that the least cloudiness occurred with this direction, thus making it especially favorable for observing the ascents.

Smoothed mean values of the mean velocity with the different wind directions, at standard levels and for the light season, the dark season, and the year, are given in table 16. The annual means are shown graphically for selected levels in figure 116. The smoothing has been carried out by means of the formula $b=\frac{a+3b+c}{5}$; and the numbers of observations at the various levels are, of course, the same as in table 15.

The average turning of the wind direction, from the surface up to stated levels and for the different surface wind directions, is given in table 17, in which a clockwise turning is counted as positive and counter-clockwise as negative. The average values were computed by finding, from the individual ascents, the average turning from one level to the next and then adding these differences to obtain the average turning from the surface. The average annual turning of the wind computed in this way is shown in figure 117.

It is of interest to compare the average turning of the wind with altitude at Little America in the Ross Sea area, and that in the Weddel Sea area as determined by Barkow (5) from the pilot-balloon ascents during the drift of the *Deutschland*. The two curves are shown in figure 119.

The mean turning of the wind has also been computed from selected pilot-balloon ascents. The ascents selected were those having the following characteristics: (1) The turning of the wind from the surface in the lower layers is counterclockwise (negative) and attains a fairly constant value (constant wind direction) in the layer from 1 to 2 km.; (2) the wind velocity increases in the lowest layer and attains a reasonably constant value between 1 and 2 km. These conditions were imposed to select, so far as possible, conditions in which there was little variation in the direction and magnitude of the pressure gradient with altitude, when the variations of wind in the lowest layer would be more dependent upon turbulence and friction than upon other factors. It should be noted that in the Southern Hemisphere, the Ekman Spiral gives a counterclockwise rotation of the wind vector with altitude, thus explaining why only the ascents having this property were selected.

The mean velocity and turning of the wind from the surface for the different surface wind directions are given in table 19, where the computation has been carried out for each minute of ascent up to 1,890 m. In table 20 the mean velocity and turning are given for the light season, dark season, and year, regardless of the surface wind directions, also shown in figures 120, 121, and 122.

In table 21 are given the mean velocity and turning of the wind in the lowest layer for low and high surface velocities. The value of 3.6 m. p. s. was used to separate the two velocity groups, since this value was found to be very close to the median of the surface velocities for the selected ascents. These tables can be used in investigating the effects of turbulence and friction from the direction and velocity profiles and for the different wind directions, different seasons, and low and high velocities.

TABLE 11A.—*Results of pilot-balloon ascents at Little America by months*

JANUARY 1929

Altitude (m.)	Number of observations	Resultant direction from	Resultant velocity (m. p. s.)	Mean velocity (m. p. s.)	Stability (percent)	Components of resultant velocity	
						N-S. (m. p. s.)	E-W. (m. p. s.)
7,000	3	S. 83° W.	18.1	19.0	95	−2.30	18.0
6,000	7	N. 82° W.	17.0	20.1	85	2.53	16.91
5,000	8	N. 86° W.	13.9	16.5	84	1.10	13.95
4,000	9	S. 87° W.	9.3	10.3	90	−.44	9.29
3,000	11	N. 76° W.	3.4	8.2	41	.83	3.35
2,500	11	S. 86° W.	3.0	7.2	42	−.21	3.01
2,000	12	S. 52° W.	3.0	5.9	51	−1.84	2.37
1,500	13	S. 43° W.	3.9	6.4	61	−2.85	2.66
1,000	15	S. 26° W.	3.4	6.3	54	−3.04	1.51
750	15	S. 19° W.	3.1	6.1	51	−2.93	.99
500	15	S. 12° W.	3.1	6.1	51	−3.06	.62
250	16	S. 6° W.	4.2	6.2	68	−4.14	.42
Surface	16	S. 8° W.	2.7	3.8	71	−2.72	.36

FEBRUARY 1929

10,000	3	N. 36° W.	6.2	6.3	98	5.07	3.63
9,000	6	N. 28° W.	9.8	10.7	92	8.65	4.68
8,000	7	N. 39° W.	11.7	14.0	84	9.10	7.34
7,000	8	N. 34° W.	8.1	9.5	85	6.74	4.55
6,000	14	N. 43° W.	7.9	9.5	83	5.79	5.36
5,000	15	N. 40° W.	5.0	7.5	67	3.80	3.23
4,000	17	N. 47° W.	4.2	5.5	76	2.81	3.05
3,000	21	N. 54° W.	1.7	4.8	35	.97	1.35
2,500	22	S. 73° E.	1.0	5.1	20	−.30	−.96
2,000	26	S. 51° E.	2.7	7.1	38	−1.71	−2.10
1,500	26	S. 53° E.	3.9	8.4	46	−2.37	−3.11
1,000	30	S. 73° E.	2.8	8.0	35	−.82	−2.65
750	32	S. 75° E.	3.8	7.9	48	−.98	−3.66
500	32	S. 78° E.	4.7	8.3	57	−.98	−4.61
250	32	S. 72° E.	5.2	8.1	64	−1.58	−5.00
Surface	33	S. 64° E.	2.8	4.4	64	−1.25	−2.56

MARCH 1929

7,000	4	N. 8° W.	10.5	15.5	68	10.40	1.52
6,000	5	N. 30° W.	8.1	14.6	55	7.02	4.10
5,000	8	N. 16° W.	5.4	11.8	46	5.20	1.50
4,000	12	N. 14° W.	4.4	9.3	47	4.23	1.06
3,000	17	N. 28° W.	4.7	10.1	47	4.15	2.20
2,500	20	N. 32° W.	3.0	10.2	29	2.52	1.60
2,000	21	N. 42° W.	1.2	8.1	15	.87	.80
1,500	23	N. 43° W.	2.2	7.9	28	1.63	1.53
1,000	24	N. 26° W.	.8	8.2	10	.72	.35
750	26	N. 18° W.	.5	8.5	6	.52	.17
500	26	N. 67° E.	1.1	8.7	13	.44	−1.03
250	27	S. 85° E.	3.4	8.7	39	−.27	−3.38
Surface	27	S. 72° E.	2.6	4.7	55	−.78	−2.43

APRIL 1929

8,000	4	S. 55° W.	9.6	17.8	54	−5.55	7.88
7,000	7	N. 76° W.	.9	15.3	6	.23	.91
6,000	10	N. 2° W.	2.6	15.0	17	2.61	.10
5,000	14	N. 26° W.	1.4	10.4	13	1.28	.61
4,000	18	N. 81° E.	2.0	8.8	23	.31	−1.96
3,000	25	S. 15° E.	1.7	7.9	22	−1.68	−.45
2,500	29	S. 11° W.	2.4	7.8	31	−2.36	.48
2,000	29	S. 4° W.	3.2	7.2	44	−3.16	.20
1,500	31	S. 24° W.	3.3	7.8	42	−3.04	1.35
1,000	31	S. 15° W.	3.7	7.3	51	−3.61	.96
750	31	S. 8° W.	3.8	7.2	53	−3.80	.51
500	31	S. 4° W.	3.8	7.1	54	−3.81	.27
250	31	S. 2° E.	3.3	6.4	52	−3.31	−.14
Surface	31	S. 24° E.	1.1	2.6	42	−1.00	−.45

TABLE 11A.—*Results of pilot-balloon ascents at Little America by months*—Continued.

MAY 1929

Altitude (m.)	Number of observations	Resultant direction from	Resultant velocity (m. p. s.)	Mean velocity (m. p. s.)	Stability (percent)	Components of resultant velocity	
						N-S. (m. p. s.)	E-W. (m. p. s.)
4,000	7	S.	4.3	7.3	59	−4.26	−0.03
3,000	8	S. 4° E.	3.8	6.0	63	−3.79	−.28
2,500	11	S. 16° W.	6.0	7.7	78	−5.82	1.65
2,000	13	S. 1° W.	4.6	6.8	68	−4.59	.09
1,500	14	S. 18° W.	4.0	7.6	53	−3.84	1.24
1,000	18	S. 5° W.	4.3	8.3	52	−4.26	.38
750	18	S. 2° E.	5.3	9.3	57	−5.28	−.23
500	18	S. 10° E.	5.5	10.5	52	−5.51	−.92
250	19	S. 4° W.	4.7	8.6	55	−4.71	.33
Surface	19	S. 15° W.	1.8	2.5	72	−1.75	.48

JUNE 1929

4,000	9	N. 3° W.	3.5	9.6	36	3.49	0.16
3,000	12	N. 12° E.	4.7	8.3	57	4.59	−.98
2,500	15	N. 7° E.	4.1	7.3	56	4.08	−.53
2,000	23	N. 68° E.	2.9	7.0	41	1.09	−2.64
1,500	26	S. 82° E.	2.6	6.8	38	−.39	−2.62
1,000	31	N. 75° E.	2.1	6.6	32	.54	−2.04
750	32	N. 73° E.	2.5	7.0	36	.73	−2.35
500	33	N. 87° E.	3.1	7.4	42	.17	−3.09
250	33	S. 85° E.	3.7	7.0	53	−.32	−3.72
Surface	33	S. 80° E.	2.1	3.4	62	−.37	−2.02

JULY 1929

4,000	6	S. 84° W.	4.8	10.5	46	−0.05	4.82
3,000	18	S. 74° W.	4.4	8.4	52	−1.20	4.26
2,500	19	S. 66° W.	5.0	7.9	63	−1.99	4.53
2,000	20	S. 49° W.	5.1	8.0	64	−3.36	3.81
1,500	22	S. 38° W.	5.4	7.8	69	−4.35	3.12
1,000	28	S. 34° W.	5.7	8.4	68	−4.78	3.18
750	29	S. 30° W.	5.5	8.3	66	−4.70	2.76
500	31	S. 26° W.	5.6	9.0	62	−5.04	2.49
250	32	S. 23° W.	4.7	7.3	64	−4.32	1.81
Surface	32	S. 36° W.	1.7	2.4	71	−1.41	1.03

AUGUST 1929

4,000	7	N. 43° W.	3.8	11.6	33	2.79	2.60
3,000	14	N. 51° W.	3.3	9.1	36	2.05	2.56
2,500	16	N. 43° W.	2.6	8.0	33	1.90	1.78
2,000	18	N. 44° W.	1.9	7.6	25	1.34	1.32
1,500	21	N. 50° W.	.6	7.8	8	.38	.46
1,000	22	S. 40° W.	1.9	9.3	20	1.44	1.19
750	22	S. 8° W.	3.2	9.0	36	−3.21	.47
500	22	S. 4° W.	3.5	8.5	41	−3.50	.22
250	22	S. 1° E.	3.6	7.0	51	−3.60	−.09
Surface	22	S. 8° W.	1.6	2.6	62	−1.57	.21

SEPTEMBER 1929

10,000	3	N. 69° E.	4.6	12.7	36	1.67	−4.33
9,000	8	N. 77° W.	7.6	15.2	50	1.65	7.36
8,000	9	N. 54° W.	6.2	13.4	46	3.63	5.02
7,000	14	N. 80° W.	6.0	12.7	47	1.05	5.85
6,000	15	N. 46° W.	3.7	11.5	32	2.53	2.67
5,000	17	N. 53° W.	1.0	10.1	10	.59	.78
4,000	22	S. 70° W.	2.2	9.3	24	−.75	2.07
3,000	24	S. 30° W.	3.4	8.7	39	−2.97	1.70
2,500	26	S. 20° W.	4.4	8.7	51	−4.13	1.51
2,000	28	S. 18° W.	5.0	8.7	57	−4.77	1.53
1,500	28	S. 19° W.	5.5	8.5	65	−5.23	1.82
1,000	28	S. 18° W.	5.6	8.7	64	−5.29	1.76
750	28	S. 19° W.	5.6	8.4	67	−5.28	1.82
500	31	S. 18° W.	4.5	7.7	58	−4.27	1.37
250	31	S. 11° W.	4.3	7.0	61	−4.22	.83
Surface	31	S. 16° W.	2.3	3.2	72	−2.18	.62

TABLE 11A.—*Results of pilot-balloon ascents at Little America by months*—Continued.

OCTOBER 1929

Altitude (m.)	Number of observations	Resultant direction from	Resultant velocity (m. p. s.)	Mean velocity (m. p. s.)	Stability (percent)	Components of resultant velocity	
						N-S. (m. p. s.)	E-W. (m. p. s.)
9,000	7	N. 88° E.	7.1	14.9	48	0.27	−7.13
8,000	12	N. 78° E.	3.3	13.8	24	.68	−3.18
7,000	16	N. 86° E.	2.7	12.0	22	.20	−2.71
6,000	17	S. 80° E.	4.3	11.7	37	−.77	−4.18
5,000	20	S. 79° E.	5.3	10.0	53	−.98	−5.22
4,000	24	S. 73° E.	5.6	8.9	63	−1.65	−5.36
3,000	30	S. 61° E.	4.2	7.6	55	−2.03	−3.65
2,500	32	S. 70° E.	4.1	7.3	56	−1.41	−3.83
2,000	36	S. 50° E.	4.3	7.7	56	−2.72	−3.30
1,500	37	S. 36° E.	4.2	7.3	58	−3.37	−2.44
1,000	40	S. 36° E.	3.0	7.3	41	−2.39	−1.74
750	40	S. 34° E.	2.9	7.0	41	−2.41	−1.65
500	41	S. 26° E.	2.8	6.9	41	−2.51	−1.25
250	41	S. 27° E.	3.2	6.2	52	−2.86	−1.48
Surface	41	S. 1° E.	1.6	3.2	50	−1.63	−.03

NOVEMBER 1929

10,000	5	N. 81° W.	4.6	10.0	46	0.70	4.50
9,000	8	N. 54° W.	1.1	9.6	11	.66	.90
8,000	14	S. 72° W.	9.1	17.0	54	−2.84	8.69
7,000	16	S. 76° W.	10.5	16.8	62	−2.49	10.19
6,000	19	S. 65° W.	11.9	16.6	72	−5.09	10.74
5,000	22	S. 52° W.	9.3	15.2	61	−5.69	7.35
4,000	24	S. 45° W.	5.5	10.9	50	−3.94	3.90
3,000	30	S. 43° W.	4.4	8.3	53	−3.17	−2.98
2,500	35	S. 46° W.	3.2	7.3	44	−2.21	2.33
2,000	38	S. 29° W.	3.0	6.4	47	−2.59	1.46
1,500	45	S. 5° W.	2.2	6.5	34	−2.22	.18
1,000	47	S. 15° E.	1.7	6.4	27	−1.67	−.44
750	49	S. 34° E.	1.2	6.4	19	−.96	−.65
500	49	S. 60° E.	1.7	6.6	26	−.80	−1.49
250	49	S. 66° E.	3.0	6.7	45	−1.19	−2.72
Surface	49	S. 58° E.	2.3	4.0	58	−1.23	−1.94

DECEMBER 1929

10,000	7	N.	4.9	6.7	73	4.94	0.04
9,000	9	N. 10° W.	6.6	10.2	65	6.51	1.19
8,000	13	N. 47° W.	8.1	14.0	58	5.50	5.95
7,000	16	N. 27° W.	10.0	15.4	65	8.89	4.46
6,000	18	N. 22° W.	7.4	13.9	53	6.88	2.72
5,000	22	N. 43° W.	5.7	13.1	44	4.18	3.91
4,000	23	N. 65° W.	3.2	8.7	37	1.33	2.87
3,000	27	S. 80° W.	1.5	6.9	22	−.26	1.50
2,500	30	S. 23° W.	1.8	6.3	29	−1.63	.70
2,000	34	S. 21° W.	2.7	6.7	40	−2.47	.96
1,500	36	S. 15° W.	3.3	6.8	49	−3.16	.86
1,000	40	S. 24° W.	2.3	6.4	36	−2.10	.93
750	40	S. 13° W.	2.3	6.3	37	−2.22	.53
500	41	S. 15° E.	2.5	6.1	41	−2.40	−.65
250	41	S. 37° E.	3.2	5.9	54	−2.55	−1.92
Surface	41	S. 40° E.	1.7	3.3	52	−1.30	−1.09

JANUARY 1930

8,000	6	N. 35° W.	5.4	11.7	46	4.47	3.12
7,000	7	N. 50° W.	4.3	10.7	40	2.74	3.30
6,000	9	N. 50° W.	5.3	8.7	61	3.39	4.07
5,000	11	N. 71° W.	5.6	8.5	66	1.79	5.33
4,000	13	S. 89° W.	4.0	7.2	56	−.06	3.99
3,000	14	S. 86° W.	4.8	7.4	65	−.32	4.75
2,500	15	N. 87° W.	2.9	7.2	40	.17	2.89
2,000	19	S. 81° E.	.8	8.4	10	−.13	−.82
1,500	28	N. 80° E.	1.6	6.9	23	.30	−1.61
1,000	31	N. 62° E.	1.1	6.8	16	.50	−.95
750	32	N. 79° E.	1.6	6.9	23	.29	−1.57
500	33	N. 77° E.	2.5	7.1	35	.58	−2.44
250	34	S. 89° E.	3.1	7.0	44	−.04	−3.07
Surface	34	S. 83° E.	2.1	4.1	51	−.25	−2.11

TABLE 11A.—*Results of pilot-balloon ascents at Little America by months*—Continued.

APRIL 1934

Altitude (m.)	Number of observations	Resultant direction from	Resultant velocity (m. p. s.)	Mean velocity (m. p. s.)	Stability (percent)	Components of resultant velocity	
						N-S. (m. p. s.)	E-W. (m. p. s.)
7,000	5	N. 26° E.	4.4	6.6	67	4.00	−1.94
6,000	8	N. 61° E.	2.8	5.6	50	1.40	−2.48
5,000	13	S. 85° E.	4.1	6.0	68	−.38	−3.99
4,000	14	S. 87° E.	5.2	6.8	76	−.24	−5.24
3,000	23	N. 70° E.	2.8	6.9	41	.98	−2.65
2,500	33	N. 57° E.	3.2	7.2	44	1.70	−2.66
2,000	44	N. 69° E.	3.5	7.5	47	1.24	−3.30
1,500	47	N. 70° E.	3.8	7.9	48	1.29	−3.60
1,000	55	N. 62° E.	3.9	7.6	51	1.82	−3.49
750	60	N. 65° E.	4.1	7.7	53	1.72	−3.74
500	66	N. 78° E.	5.1	8.7	59	1.08	−4.98
250	72	S. 87° E.	6.1	8.5	72	−.34	−6.10
Surface	73	S. 73° E.	4.0	5.7	70	−1.19	−3.82

MAY 1934

7,000	4	N. 6° W.	3.6	3.8	95	3.58	0.40
6,000	8	N. 70° W.	4.7	6.2	76	1.62	4.44
5,000	11	N. 83° W.	3.5	5.4	65	.42	3.49
4,000	20	S. 37° W.	2.5	7.0	36	−2.01	1.54
3,000	29	S. 12° W.	2.5	8.0	31	−2.47	.54
2,500	36	S. 8° E.	3.5	8.5	41	−3.43	−.45
2,000	40	S. 8° E.	3.7	8.5	44	−3.64	−.54
1,500	43	S. 16° E.	4.1	8.4	49	−3.97	−1.12
1,000	47	S. 29° E.	3.3	8.1	41	−2.87	−1.59
750	51	S. 44° E.	2.9	8.1	36	−2.11	−2.04
500	53	S. 50° E.	3.4	8.1	42	−2.19	−2.63
250	57	S. 54° E.	4.1	7.5	55	−2.37	−3.30
Surface	58	S. 54° E.	2.4	4.1	59	−1.43	−1.96

JUNE 1934

6,000	4	N. 37° W.	10.5	11.0	95	8.38	6.38
5,000	14	S. 82° W.	2.1	9.4	22	−.27	2.07
4,000	20	S. 69° E.	1.3	9.4	14	−.47	−1.20
3,000	29	S. 33° E.	2.5	9.3	27	−2.13	−1.38
2,500	33	S. 43° E.	2.5	8.5	29	−1.82	−1.71
2,000	36	S. 46° E.	2.7	8.4	32	−1.88	−1.93
1,500	39	S. 40° E.	3.3	7.9	42	−2.52	−2.08
1,000	42	S. 44° E.	2.9	8.4	35	−2.07	−1.98
750	42	S. 43° E.	2.6	8.5	31	−1.91	−1.80
500	43	S. 40° E.	2.9	8.5	34	−2.24	−1.86
250	46	S. 45° E.	3.8	8.0	48	−2.67	−2.64
Surface	46	S. 47° E.	2.2	4.7	47	−1.47	−1.57

JULY 1934

6,000	11	W.	7.1	10.7	66	−0.06	7.09
5,000	14	S. 89° W.	4.0	8.1	49	−.08	4.03
4,000	22	S. 85° W.	3.3	8.3	40	−.28	3.28
3,000	31	S. 80° W.	3.5	8.0	44	−.61	3.45
2,500	35	S. 73° W.	2.8	8.1	35	−.81	2.71
2,000	37	S. 53° W.	2.8	7.7	36	−1.69	2.27
1,500	40	S. 48° W.	2.5	7.3	34	−1.66	1.88
1,000	42	S. 18° W.	3.9	7.7	51	−3.72	1.24
750	45	S. 16° W.	3.4	7.8	44	−3.27	.95
500	49	S. 8° W.	3.2	8.4	38	−3.17	.45
250	50	S. 2° W.	3.2	7.6	42	−3.23	.11
Surface	51	S. 1° W.	1.7	3.7	46	−1.69	.04

TABLE 11A.—*Results of pilot-balloon ascents at Little America by months*—Continued.

AUGUST 1934

Altitude (m.)	Number of observations	Resultant direction from	Resultant velocity (m. p. s.)	Mean velocity (m. p. s.	Stability (percent)	Components of resultant velocity	
						N-S. (m. p. s.)	E-W. (m. p. s.)
7,000	7	S. 84° W.	3.0	13.4	22	−0.29	2.99
6,000	8	S. 79° W.	1.1	9.2	12	−.21	1.09
5,000	14	N. 27° W.	.1	8.4	1	.07	.04
4,000	17	S. 59° E.	1.3	8.5	15	−.67	−1.12
3,000	31	S. 64° E.	1.2	7.9	15	−.59	−1.20
2,500	32	S. 9° E.	1.4	7.5	19	−1.37	−.21
2,000	34	S. 12° E.	2.4	7.6	32	−2.30	−.51
1,500	38	S. 2° E.	3.1	7.2	43	−3.08	−.09
1,000	41	S. 2° W.	3.4	7.3	47	−3.44	.10
750	41	S. 1° E.	4.2	7.8	54	−4.08	−.98
500	43	S.	4.1	8.3	49	−4.09	−.07
250	45	S. 2° W.	4.0	7.7	52	−3.97	.12
Surface	45	S.	1.2	3.1	39	−1.22	.00

SEPTEMBER 1934

10,000	4	N. 17° W.	4.9	7.5	65	4.70	1.40
9,000	4	N. 15° E.	2.4	5.8	41	2.35	−.62
8,000	6	N. 3° E.	2.9	5.8	50	2.88	−.13
7,000	8	N. 28° W.	4.1	7.5	55	3.64	1.90
6,000	12	N. 17° W.	4.2	6.6	64	3.98	1.20
5,000	17	N. 4° W.	3.6	7.5	48	3.55	.22
4,000	23	N. 71° W.	1.5	7.4	20	.49	1.42
3,000	27	S. 81° W.	.1	6.6	2	−.16	1.00
2,500	30	S. 51° W.	1.5	6.6	23	−.95	1.16
2,000	36	S. 43° W.	2.3	7.4	31	−1.70	1.58
1,500	40	S. 46° W.	3.1	8.0	39	−2.18	2.23
1,000	43	S. 37° W.	2.8	9.2	30	−2.23	1.71
750	43	S. 43° W.	3.4	9.5	36	−2.49	2.32
500	45	S. 30° W.	3.4	9.4	36	−2.91	1.68
250	45	S. 30° W.	3.0	7.4	41	−2.57	1.50
Surface	46	S. 26° W.	1.2	3.3	36	−1.10	.55

OCTOBER 1934

7,000	5	N. 81° W.	10.6	11.8	90	1.58	10.46
6,000	8	N. 82° W.	7.5	8.5	88	1.05	7.41
5,000	15	N. 83° W.	7.2	9.1	79	.92	7.14
4,000	17	S. 85° W.	6.5	8.1	80	−.61	6.50
3,000	22	S. 68° W.	3.9	7.3	53	−1.45	3.64
2,500	25	S. 55° W.	3.6	6.9	52	−2.07	2.95
2,000	30	S. 52° W.	2.6	6.3	41	−1.63	2.06
1,500	34	S. 31° W.	2.0	6.4	31	−1.73	1.04
1,000	39	S. 22° W.	1.9	7.2	26	−1.74	.71
750	41	S. 39° W.	2.1	7.5	28	−1.64	1.32
500	44	S. 7° W.	1.8	8.0	22	−1.75	.23
250	44	S. 42° E.	2.4	7.6	32	−1.77	−1.58
Surface	44	S. 45° E.	1.8	4.8	38	−1.30	−1.31

TABLE 11A.—*Results of pilot-balloon ascents at Little America by months*—Continued.

NOVEMBER 1934

Altitude (m.)	Number of observations	Resultant direction from	Resultant velocity (m. p. s.)	Mean velocity (m. p. s.)	Stability (percent)	Components of resultant velocity	
						N-S. (m. p. s.)	E-W. (m. p. s.)
9,000	7	S. 41° W.	0.9	6.9	13	−0.71	0.61
8,000	11	N. 51° E.	3.0	7.3	41	1.86	−2.30
7,000	13	S. 85° E.	3.3	7.0	47	−.32	−3.32
6,000	18	S. 79° E.	2.7	7.4	36	−.49	−2.62
5,000	24	S. 40° E.	4.0	8.2	49	−3.07	−2.61
4,000	28	S. 34° E.	4.2	7.4	57	−3.43	−2.33
3,000	34	S. 29° E.	3.8	7.3	52	−3.34	−1.89
2,500	42	S. 33° E.	4.0	6.7	60	−3.35	−2.17
2,000	47	S. 13° E.	3.4	7.5	45	−3.29	−.75
1,500	48	S. 2° E.	2.8	7.1	39	−2.76	−.08
1,000	57	S. 13° W.	1.5	6.8	22	−1.47	.35
750	58	S. 9° W.	1.7	6.8	25	−1.71	.27
500	63	S. 8° E.	1.1	6.5	17	−1.07	−.16
250	66	S. 38° E.	2.0	6.0	33	−1.55	−1.20
Surface	69	S. 30° E.	2.1	4.5	47	−1.79	−1.02

DECEMBER 1934

9,000	4	S. 40° E.	5.1	8.0	64	−3.88	−3.30
8,000	12	S. 46° E.	5.1	10.1	50	−3.55	−3.71
7,000	21	S. 46° E.	6.4	10.2	63	−4.50	−4.61
6,000	29	S. 56° E.	6.8	10.9	62	−3.82	−5.65
5,000	34	S. 61° E.	6.5	9.2	71	−3.10	−5.68
4,000	39	S. 52° E.	5.6	7.7	73	−3.46	−4.43
3,000	45	S. 47° E.	4.8	7.0	69	−3.29	−3.56
2,500	50	S. 41° E.	3.9	6.3	62	−2.98	−2.57
2,000	52	S. 37° E.	3.5	6.2	56	−2.78	−2.13
1,500	56	S. 27° E.	3.2	5.7	56	−2.89	−1.45
1,000	61	S. 13° E.	2.9	5.5	53	−2.78	−.65
750	64	S. 7° E.	2.8	5.8	48	−2.78	−.35
500	69	S. 25° E.	2.4	5.8	41	−2.15	−1.01
250	72	S. 29° E.	2.4	5.3	45	−2.08	−1.18
Surface	71	S. 34° E.	1.8	3.7	49	−1.50	−1.01

JANUARY 1935

9,000	3	S. 69° E.	7.1	8.7	82	−2.57	−6.63
8,000	8	N. 73° W.	12.7	25.0	51	3.79	12.1
7,000	14	S. 85° W.	9.7	19.7	49	−.91	9.69
6,000	15	S. 64° W.	4.9	12.1	40	−2.15	4.43
5,000	19	S. 67° W.	2.5	9.1	27	−.97	2.32
4,000	24	S. 13° W.	2.4	8.5	28	−2.38	.56
3,000	27	S. 34° E.	2.7	7.3	37	−2.23	−1.48
2,500	28	S. 45° E.	3.0	7.3	41	−2.14	−2.17
2,000	31	S. 36° E.	3.0	7.6	39	−2.38	−1.74
1,500	37	S. 49° E.	3.0	7.4	41	−1.96	−2.27
1,000	42	S. 66° E.	2.6	7.2	36	−1.06	−2.42
750	44	S. 66° E.	3.1	7.5	41	−1.27	−2.81
500	46	S. 68° E.	3.3	7.9	42	−1.23	−3.10
250	52	S. 67° E.	3.6	7.6	47	−1.38	−3.31
Surface	57	S. 51° E.	2.3	5.4	43	−1.47	−1.80

TABLE 12.—*Results of pilot-balloon ascents at Little America by months, combined data, 1929 and 1934*

JANUARY 1929, 1930, 1935

Altitude (m.)	Number of observations	Mean direction	Resultant direction (m. p. s.)	Mean velocity (m. p. s.)	Resultant velocity (m. p. s.)	Stability (percent)	Components	
							N.-S. (m. p. s.)	E.-W. (m. p. s.)
9,000	6	N. 45° E.	N. 57° E.	8. 5	2. 2	26	1. 20	−1. 84
8,000	16	N. 34° W.	N. 67° W.	18. 6	9. 5	51	3. 69	8. 78
7,000	24	N. 69° W.	W.	17. 0	8. 9	52	−. 02	8. 87
6,000	31	N. 74° W.	N. 86° W.	12. 9	7. 2	56	. 51	7. 15
5,000	38	N. 74° W.	N. 87° W.	10. 5	5. 7	54	. 27	5. 64
4,000	46	S. 79° W.	S. 68° W.	8. 5	3. 5	41	−1. 34	3. 24
3,000	52	S. 34° W.	S. 49° W.	7. 5	1. 6	21	−1. 07	1. 22
2,500	54	S.	S. 15° W.	7. 3	1. 2	16	−1. 11	. 29
2,000	62	S. 22° E.	S. 23° E.	7. 5	1. 7	23	−1. 59	−. 66
1,500	78	S. 48° E.	S. 43° E.	7. 0	1. 8	26	−1. 30	−1. 21
1,000	88	S. 52° E.	S. 56° E.	6. 9	1. 5	22	−. 85	−1. 23
750	91	S. 64° E.	S. 60° E.	7. 1	2. 0	28	−. 99	−1. 75
500	94	S. 74° E.	S. 69° E.	7. 3	2. 4	33	−. 89	−2. 27
250	102	S. 61° E.	S. 63° E.	7. 2	3. 0	42	−1. 37	−2. 65
Surface	107	S. 52° E.	S. 51° E.	4. 7	2. 0	43	−1. 27	−1. 58

FEBRUARY 1929

10,000	3	N. 38° W.	N. 36° W.	6. 3	6. 2	98	5. 07	3. 63
9,000	6	N. 25° W.	N. 28° W.	10. 7	9. 8	92	8. 65	4. 68
8,000	7	N. 27° W.	N. 39° W.	14. 0	11. 7	84	9. 10	7. 34
7,000	8	N. 35° W.	N. 34° W.	9. 5	8. 1	85	6. 74	4. 55
6,000	14	N. 49° W.	N. 43° W.	9. 5	7. 9	83	5. 79	5. 36
5,000	15	N. 53° W.	N. 40° W.	7. 5	5. 0	67	3. 80	3. 23
4,000	17	N. 48° W.	N. 47° W.	5. 5	4. 2	76	2. 81	3. 05
3,000	21	N. 51° W.	N. 54° W.	4. 8	1. 7	35	. 97	1. 35
2,500	22	S. 46° E.	S. 73° E.	5. 1	1. 0	20	−. 30	−. 96
2,000	26	S. 47° E.	S. 51° E.	7. 1	2. 7	38	−1. 71	−2. 10
1,500	26	S. 55° E.	S. 53° E.	8. 4	3. 9	46	−2. 37	−3. 11
1,000	30	S. 56° E.	S. 73° E.	8. 0	2. 8	35	−. 82	−2. 65
750	32	S. 75° E.	S. 75° E.	7. 9	3. 8	48	−. 98	−3. 66
500	32	S. 84° E.	S. 78° E.	8. 3	4 7	57	−. 98	−4. 61
250	32	S. 70° E.	S. 72° E.	8. 1	5. 2	64	−1. 58	−5. 00
Surface	33	S. 56° E.	S. 64° E.	4. 4	2. 8	64	−1. 25	−2. 56

MARCH 1929

7,000	4	N. 4° W.	N. 8° W.	15. 5	10. 5	68	10. 40	1. 52
6,000	5	N. 18° W.	N. 30° W.	14. 6	8. 1	55	7. 02	4. 10
5,000	8	N. 7° E.	N. 16° W.	11. 8	5. 4	46	5. 20	1. 50
4,000	12	N. 3° E.	N. 14° W.	9. 3	4. 4	47	4. 23	1. 06
3,000	17	N. 7° W.	N. 28° W.	10. 1	4. 7	47	4. 15	2. 20
2,500	20	N. 6° W.	N. 32° W.	10. 2	3. 0	29	2. 52	1. 60
2,000	21	N. 13° E.	N. 42° W.	8. 1	1. 2	15	. 87	. 80
1,500	23	N. 12° W.	N. 43° W.	7. 9	2. 2	28	1. 63	1. 53
1,000	24	N. 75° E.	N. 26° W.	8. 2	. 8	10	. 72	. 35
750	26	N. 45° E.	N. 18° W.	8. 5	. 5	6	. 52	. 17
500	26	S. 77° E.	N. 67° W.	8. 7	1. 1	13	. 44	−1. 03
250	27	S. 72° E.	S. 85° E.	8. 7	3. 4	39	−. 27	−3. 38
Surface	27	S. 42° E.	S. 72° E.	4. 7	2 6	55	−. 78	−2. 43

APRIL 1929, 1934

9,000	3	S. 63° E.	S. 48° W.	21. 7	6. 5	30	−4. 37	4. 80
8,000	6	N. 14° W.	S. 64° W.	14. 2	5. 2	37	−2. 28	4. 63
7,000	12	N. 30° E.	N. 9° E.	11. 7	1. 8	15	1. 80	−. 28
6,000	18	N. 61° E.	N. 27° E.	10. 8	2. 3	21	2. 07	−1. 04
5,000	27	S. 82° E.	N. 73° E.	8. 3	1. 7	20	. 48	−1. 60
4,000	32	S. 81° E.	N. 89° E.	7. 9	3. 4	43	. 07	−3. 39
3,000	48	S. 49° E.	S. 75° E.	7. 4	1. 6	22	−. 40	−1. 50
2,500	62	S. 59° E.	S. 80° E.	7. 5	1. 2	16	−. 20	−1. 19
2,000	73	S. 70° E.	S. 75° E.	7. 4	2. 0	27	−. 51	−1. 91
1,500	78	S. 65° E.	S. 75° E.	7. 8	1. 7	22	−. 43	−1. 63
1,000	86	S. 72° E.	S. 86° E.	7. 5	1. 9	25	−. 14	−1. 89
750	91	S. 73° E.	S. 86° E.	7. 5	2. 3	31	−. 16	−2. 29
500	97	S. 71° E.	S. 82° E.	8. 2	3. 3	40	−. 48	−3. 31
250	103	S. 66° E.	S. 75° E.	7. 8	4. 5	58	−1. 23	−4. 31
Surface	104	S. 40° E.	S. 68° E.	4. 8	3. 0	62	−1. 13	−1. 82

TABLE 12.—*Results of pilot-balloon ascents at Little America by months, combined data, 1929 and 1934*—Continued

MAY 1929, 1934

Altitude (m.)	Number of observations	Mean direction	Resultant direction (m. p. s.)	Mean velocity (m. p. s.)	Resultant velocity (m. p. s.)	Stability (percent)	Components	
							N.-S. (m. p. s.)	E.-W. (m. p. s.)
7,000	4	N. 6° W.	N. 6° W.	3. 8	3. 6	95	3. 58	0. 40
6,000	8	N. 34° W.	N. 70° W.	6. 2	4. 7	76	1. 62	4. 44
5,000	13	N. 49° W.	N. 80° W.	5. 9	2. 4	41	. 42	2. 41
4,000	27	S. 5° E.	S. 24° W.	7. 1	2. 8	39	−2. 59	1. 13
3,000	37	S. 1° E.	S. 8° W.	7. 6	2. 8	37	−2. 75	. 36
2,500	47	S. 11° E.	S. 1° W.	8. 3	4. 0	48	−3. 99	. 04
2,000	53	S. 16° E.	S. 6° E.	8. 1	3. 9	48	−3. 88	. 38
1,500	57	S. 21° E.	S. 8° E.	8. 2	4. 0	49	−3. 94	−. 54
1,000	65	S. 25° E.	S. 18° E.	8. 1	3. 4	42	−3. 25	−1. 04
750	69	S. 35° E.	S. 28° E.	8. 4	3. 3	39	−2. 94	−1. 57
500	71	S. 43° E.	S. 36° E.	8. 7	3. 7	43	−3. 03	−2. 19
250	76	S. 42° E.	S. 39° E.	7. 8	3. 8	49	−2. 96	−2. 39
Surface	77	S. 28° E.	S. 42° E.	3. 7	2. 0	54	−1. 51	−1. 35

JUNE 1929, 1934

6,000	4	N. 34° W.	N. 37° W.	11. 0	10. 5	95	8. 38	6. 38
5,000	15	S. 63° W.	S. 70° W.	9. 2	1. 7	18	−. 58	1. 61
4,000	29	S. 45° E.	S. 46° E.	9. 5	1. 1	12	. 76	−. 78
3,000	41	S. 65° E.	S. 83° E.	9. 0	1. 3	14	−. 16	−1. 27
2,500	48	N. 85° E.	N. 89° E.	8. 1	1. 3	16	. 02	−1. 34
2,000	59	N. 89° E.	S. 72° E.	7. 9	2. 3	29	−. 27	−2. 21
1,500	65	S. 79° E.	S. 54° E.	7. 5	2. 8	37	−1. 67	−2. 30
1,000	73	S. 71° E.	S. 64° E.	7. 5	2. 2	29	−. 96	−2. 00
750	74	S. 79° E.	S. 69° E.	7. 9	2. 2	28	−. 77	−2. 04
500	76	S. 74° E.	S. 64° E.	8. 0	2. 7	34	−1. 19	−2. 37
250	79	S. 58° E.	S. 62° E.	7. 6	3. 5	46	−1. 68	−3. 09
Surface	79	S. 51° E.	S. 60° E.	4. 2	2. 0	48	−1. 01	−1. 76

JULY 1929, 1934

7,000	2	S. 76° E.	N. 28° E.	6. 0	4. 1	68	3. 60	−1. 90
6,000	11	N. 74° W.	W.	10. 7	7. 1	66	−. 06	7. 09
5,000	15	N. 60° W.	N. 87° W.	7. 9	4. 0	51	. 21	4. 04
4,000	28	S. 85° W.	S. 86° W.	8. 8	3. 6	41	−. 23	3. 61
3,000	49	S. 69° W.	S. 78° W.	8. 1	3. 8	47	−. 83	3. 75
2,500	54	S. 61° W.	S. 70° W.	8. 0	3. 6	45	−1. 22	3. 35
2,000	57	S. 51° W.	S. 51° W.	7. 8	3. 6	46	−2. 27	2. 81
1,500	62	S. 47° W.	S. 42° W.	7. 5	3. 5	47	−2. 62	2. 32
1,000	70	S. 23° W.	S. 26° W.	8. 0	4. 6	58	−4. 14	2. 01
750	74	S. 19° W.	S. 23° W.	8. 0	4. 2	52	−3. 83	1. 66
500	80	S. 13° W.	S. 18° W.	8. 6	4. 1	48	−3. 89	1. 24
250	82	S. 8° W.	S. 12° W.	7. 5	3. 7	49	−3. 65	. 77
Surface	83	S. 17° W.	S. 15° W.	3. 2	1. 6	50	−1. 59	. 42

AUGUST 1929, 1934

7,000	7	S. 45° W.	S. 84° W.	13. 4	3. 0	22	−2. 29	2. 99
6,000	9	S. 34° W.	S. 9° W.	10. 0	1. 8	18	−1. 83	. 29
5,000	16	S. 80° W.	S. 68° W.	9. 2	. 7	8	− . 26	. 65
4,000	24	N. 47° E.	N. 6° E.	9. 4	. 3	3	. 34	−. 03
3,000	45	N. 2° E.	N. 7° E.	8. 3	. 2	2	. 23	−. 03
2,500	48	S. 72° W.	S. 58° W.	7. 7	. 5	6	−. 28	. 45
2,000	52	S. 14° W.	S. 7° W.	7. 6	1. 1	14	−1. 07	. 12
1,500	59	S.	S. 3° W.	7. 4	1. 9	26	−1. 85	. 10
1,000	63	S. 4° E.	S. 10° W.	8. 0	2. 8	35	−2. 74	. 48
750	63	S. 11° E.	S. 2° W.	8. 2	3. 8	46	−3. 78	. 10
500	65	S. 11° E.	S.	8. 4	3. 9	46	−3. 89	. 03
250	67	S. 5° E.	S. 1° W.	7. 4	3. 9	53	−3. 85	. 06
Surface	67	S. 8° W.	S. 3° W.	2. 9	1. 3	45	−1. 34	. 07

TABLE 12.—*Results of pilot-balloon ascents at Little America by months, combined data, 1929 and 1934*—Continued

SEPTEMBER 1929, 1934

Altitude (m.)	Number of observations	Mean direction	Resultant direction from	Mean velocity (m. p. s.)	Resultant velocity (m. p. s.)	Stability (percent)	Components	
							N.-S. (m. p. s.)	E.-W. (m. p. s.)
11,000	4	N. 19° E.	N. 15° E.	14.2	10.2	72	9.82	−2.58
10,000	7	N. 33° E.	N. 17° E.	9.7	3.6	37	3.40	−1.06
9,000	12	N. 33° W.	N. 68° W.	12.1	5.1	42	1.88	4.70
8,000	15	N. 19° W.	N. 42° W.	10.4	4.5	43	3.33	2.96
7,000	22	N. 46° W.	N. 66° W.	10.8	4.9	45	1.99	4.43
6,000	27	N. 23° W.	N. 32° W.	9.3	3.8	41	3.18	2.01
5,000	34	N. 3° W.	N. 14° W.	8.8	2.1	24	2.07	.50
4,000	45	N. 75° W.	S. 86° W.	8.3	1.7	20	−.12	1.74
3,000	51	S. 74° W.	S. 42° W.	7.6	2.0	26	−1.48	1.33
2,500	56	S. 52° W.	S. 29° W.	7.6	2.8	37	−2.43	1.32
2,000	64	S. 29° W.	S. 27° W.	8.0	3.4	42	−3.04	1.56
1,500	68	S. 32° W.	S. 31° W.	8.2	4.0	49	−3.44	2.06
1,000	71	S. 20° W.	S. 27° W.	9.0	3.8	42	−3.44	1.73
750	71	S. 22° W.	S. 31° W.	9.1	4.2	46	−3.59	2.13
500	76	S. 23° W.	S. 24° W.	8.7	3.8	44	−3.46	1.56
250	76	S. 22° W.	S. 21° W.	7.2	3.5	49	−3.24	1.23
Surface	77	S. 22° W.	S. 21° W.	3.3	1.6	48	−1.54	.58

OCTOBER 1929, 1934

9,000	7	S. 79° E.	N. 88° E.	14.9	7.1	48	0.27	−7.13
8,000	14	S. 83° E.	N. 53° E.	13.1	1.8	14	1.10	−1.47
7,000	21	N. 29° E.	N. 39° W.	12.0	.7	6	.53	.43
6,000	25	N. 58° W.	S. 68° E.	10.7	.5	5	−.19	−.47
5,000	35	N. 3° E.	S. 24° W.	9.6	.2	2	−.17	.07
4,000	41	S. 5° E.	S. 20° E.	8.5	1.3	15	−1.22	−.44
3,000	52	S. 2° E.	S. 18° E.	7.5	1.9	25	−1.79	−.57
2,500	57	S. 10° E.	S. 27° E.	7.2	1.9	26	−1.70	−.86
2,000	66	S. 25° E.	S. 21° E.	7.1	2.4	34	−2.23	−.86
1,500	71	S. 33° E.	S. 17° E.	6.9	2.7	39	−2.58	−.77
1,000	79	S. 32° E.	S. 14° E.	7.2	2.1	29	−2.07	−.53
750	81	S. 31° E.	S. 4° E.	7.3	2.0	27	−2.02	−.15
500	85	S. 35° E.	S. 13° E.	7.5	2.2	29	−2.12	−.48
250	85	S. 45° E.	S. 34° E.	6.9	2.8	41	−2.29	−1.53
Surface	85	S. 8° W.	S. 25° E.	4.0	1.6	40	−1.46	−.69

TABLE 12.—*Results of pilot-balloon ascents at Little America by months, combined data, 1929 and 1934*—Continued

NOVEMBER 1929, 1934

Altitude (m.)	Number of observations	Mean direction	Resultant direction from	Mean velocity (m. p. s.)	Resultant velocity (m. p. s.)	Stability (percent)	Components	
							N.-S. (m. p. s.)	E.-W. (m. p. s.)
10,000	7	N. 50° W.	N. 76° W.	10.0	5.9	59	1.41	5.71
9,000	15	N. 48° E.	N. 88° W.	8.3	.8	10	.02	.77
8,000	25	N. 41° W.	S. 79° W.	12.7	3.9	31	−.77	3.85
7,000	29	S. 29° W.	S. 70° W.	12.4	4.4	35	−1.52	4.14
6,000	37	S. 42° W.	S. 56° W.	12.1	5.1	42	−2.85	4.24
5,000	46	S. 3° W.	S. 26° W.	11.6	4.8	41	−4.32	2.16
4,000	52	S. 9° E.	S. 8° W.	9.0	3.7	41	−3.67	.54
3,000	64	S. 4° E.	S. 7° W.	7.8	3.3	42	−3.26	.40
2,500	77	S. 12° E.	S. 3° E.	6.9	2.8	41	−2.83	−.13
2,000	85	S. 12° E.	S. 4° W.	7.0	3.0	43	−2.98	.23
1,500	93	S. 11° E.	S. 1° W.	6.8	2.5	37	−2.50	.05
1,000	104	S. 15° E.	S.	6.6	1.6	24	−1.56	−0.1
750	107	S. 27° E.	S. 6° E.	6.6	1.4	21	−1.37	−.15
500	112	S. 48° E.	S. 38° E.	6.5	1.2	18	−.95	−.74
250	115	S. 44° E.	S. 53° E.	6.3	2.3	37	−.39	−1.85
Surface	118	S. 29° E.	S. 42° E.	4.3	2.1	49	−1.56	−1.40

DECEMBER 1929, 1934

10,000	8	N. 12° E.	N. 8° E.	6.5	4.4	68	4.32	−0.59
9,000	13	N. 17° E.	N. 3° E.	9.5	3.3	35	3.32	−.19
8,000	25	N. 35° W.	N. 49° W.	12.1	1.8	15	1.16	1.32
7,000	37	S. 86° E.	N. 28° E.	12.5	1.5	12	1.29	−.69
6,000	47	S. 75° E.	N. 84° E.	12.0	2.5	21	.28	−2.45
5,000	56	S. 68° E.	S. 83° E.	10.7	1.9	18	−.24	−1.91
4,000	62	S. 53° E.	S. 46° E.	8.1	2.4	30	−1.69	−1.72
3,000	72	S. 40° E.	S. 38° E.	7.0	2.7	39	−2.15	−1.66
2,500	80	S. 22° E.	S. 29° E.	6.3	2.8	44	−2.47	−1.35
2,000	86	S. 16° E.	S. 19° E.	6.4	2.8	44	−2.66	−.91
1,500	92	S. 11° E.	S. 10° E.	6.1	3.0	49	−3.00	−.54
1,000	101	S. 2° E.	S. 1° E.	5.8	2.5	43	−2.51	−.03
750	104	S. 3° E.	S.	6.0	2.6	43	−2.57	−.01
500	110	S. 21° E.	S. 21° E.	5.9	2.4	41	−2.24	−.87
250	113	S. 24° E.	S. 33° E.	5.5	2.7	49	−2.25	−1.45
Surface	112	S. 26° E.	S. 36° E.	3.6	1.8	50	−1.43	−1.04

TABLE 13.—*Results of pilot-balloon ascents at Little America by season and year, combined data, 1929 and 1934*

SUMMER: DECEMBER, JANUARY, FEBRUARY, COMBINED DATA, 1929 AND 1934

Altitude (m.)	Number of observations	Mean direction from	Resultant direction from	Mean velocity (m. p. s.)	Resultant velocity (m. p.s.)	Stability (per cent)	Components of resultant velocity	
							N-S. (m.p.s.)	E-W. (m.p.s.)
11,000	3	N. 39° W.	N. 42° E.	5. 7	2. 2	39	1. 60	−1. 47
10,000	13	N. 8° W.	N. 5° E.	6. 5	3. 3	51	3. 28	−. 30
9,000	25	N. 3° W.	N. 11° W.	9. 6	3. 9	41	3. 81	. 72
8,000	48	N. 12° W.	N. 56° W.	14. 5	5. 7	39	3. 16	4. 68
7,000	69	N. 13° W.	N. 66° W.	13. 7	3. 6	26	1. 47	3. 24
6,000	92	N. 36° W.	N. 59° W.	12. 0	2. 3	19	1. 20	1. 97
5,000	109	N. 66° W.	N. 71° W.	10. 2	1. 5	15	. 49	1. 43
4,000	125	S. 30° W.	S. 38° W.	7. 9	1. 2	15	−. 95	. 75
3,000	145	S. 17° E.	S. 8° E.	6. 9	1. 3	19	−1. 31	−. 19
2,500	156	S. 20° E.	S. 23° E.	6. 5	1. 8	28	−1. 69	−. 72
2,000	174	S. 23° E.	S. 25° E.	6. 9	2. 4	35	−2. 14	−1. 00
1,500	196	S. 28° E.	S. 27° E.	6. 8	2. 5	37	−2. 24	−1. 15
1,000	219	S. 23° E.	S. 28° E.	6. 6	1. 8	27	−1. 61	−. 87
750	227	S. 32° E.	S. 36° E.	6. 7	2. 1	31	−1. 71	−1. 22
500	236	S. 45° E.	S. 52° E.	6. 8	2. 5	37	−1. 53	−1. 94
250	247	S. 40° E.	S. 53° E.	6. 5	3. 0	46	−1. 80	−2. 40
Surface	252	S. 26° E.	S. 48° E.	4. 2	2. 0	48	−1. 34	−1. 47

SPRING: SEPTEMBER, OCTOBER, NOVEMBER, COMBINED DATA, 1929 AND 1934

13,000	3	N. 66° W.	N. 70° W.	17. 7	5. 6	32	1. 90	5. 27
12,000	4	N. 19° W.	N. 7° W.	17. 5	6. 8	39	6. 78	. 85
11,000	6	N. 15° W.	N. 24° W.	14. 7	8. 1	55	7. 32	3. 30
10,000	16	N. 13° E.	N. 22° W.	9. 9	2. 1	21	1. 91	. 76
9,000	34	N. 22° E.	N. 36° W.	11. 0	0. 9	8	. 73	. 53
8,000	54	N. 7° W.	N. 69° W.	12. 2	2. 4	20	. 86	2. 22
7,000	72	N. 59° W.	N. 87° W.	11. 8	3. 1	26	. 15	3. 14
6,000	89	N. 56° W.	S. 83° W.	10. 9	2. 3	21	−. 28	2. 24
5,000	115	S. 22° W.	S. 42° W.	10. 1	1. 6	16	−1. 17	1. 03
4,000	138	S. 13° W.	S. 20° W.	8. 6	1. 9	22	−1. 78	. 64
3,000	167	S. 10° W.	S. 10° W.	7. 6	2. 3	30	−2. 26	. 38
2,500	190	S. 1° W.	S. 2° W.	7. 2	2. 4	33	−2. 37	. 08
2,000	215	S. 3° E.	S. 6° W.	7. 3	2. 8	38	−2. 77	. 29
1,500	232	S. 4° E.	S. 8° W.	7. 2	2. 8	39	−2. 80	. 39
1,000	254	S. 8° E.	S. 8° W.	7. 5	2. 3	31	−2. 24	. 31
750	259	S. 9° E.	S. 12° W.	7. 5	2. 2	29	−2. 18	. 47
500	273	S. 20° E.	S. 1° E.	7. 4	2. 0	27	−2. 01	−. 02
250	276	S. 24° E.	S. 22° E.	6. 7	2. 4	36	−2. 18	−. 90
Surface	280	S. 7° E.	S. 23° E.	3. 9	2. 2	56	−1. 52	−. 64

WINTER: JUNE, JULY, AUGUST, COMBINED DATA, 1929 AND 1934

8,000	3	S. 66° W.	N. 3° E.	8. 7	4. 2	48	4. 17	−0. 20
7,000	11	N. 57° W.	N. 54° W.	12. 9	4. 8	37	2. 79	3. 87
6,000	24	N. 65° W.	N. 81° W.	10. 5	4. 5	43	. 68	4. 42
5,000	46	N. 70° W.	S. 84° W.	8. 8	2. 1	24	−. 21	2. 07
4,000	81	N. 82° W.	S. 73° W.	9. 2	1. 0	11	−. 29	. 96
3,000	135	S. 61° W.	S. 74° W.	8. 4	1. 0	12	−. 27	. 97
2,500	150	S. 49° W.	S. 60° W.	7. 9	1. 0	13	−. 52	. 92
2,000	168	S. 7° W.	S. 9° W.	7. 8	1. 4	18	−1. 35	. 22
1,500	186	S. 6° E.	S.	7. 4	2. 0	27	−2. 04	------
1,000	206	S. 8° E.	S. 3° W.	7. 8	2. 6	33	−2. 59	. 12
750	211	S. 12° E.	S. 2° E.	8. 0	2. 7	34	−2. 74	−. 10
500	221	S. 16° E.	S. 7° E.	8. 4	3. 0	36	−2. 96	−. 37
250	228	S. 15° E.	S. 14° E.	7. 5	3. 1	41	−3. 03	−. 78
Surface	229	S. 5° E.	S. 18° E.	3. 5	1. 4	40	−1. 31	−. 43

TABLE 13.—*Results of pilot-balloon ascents at Little America by season and year, combined data, 1929 and 1934*—Continued

AUTUMN: MARCH, APRIL, MAY, COMBINED DATA, 1929 AND 1934

Altitude (m.)	Number of observations	Mean direction from	Resultant direction from	Mean velocity (m. p.s.)	Resultant velocity (m. p.s.)	Stability (per cent)	Components of resultant velocity	
							N-S. (m.p.s.)	E-W. (m.p.s.)
9,000	5	N. 30° E.	S. 63° W.	14. 6	2. 6	18	1. 14	2. 28
8,000	10	N. 18° E.	N. 70° W.	11. 6	2. 4	21	. 83	2. 29
7,000	20	N. 8° E.	N. 3° W.	10. 8	3. 9	36	3. 88	. 22
6,000	31	N. 5° E.	N. 24° W.	10. 3	3. 0	29	2. 75	1. 20
5,000	48	N. 49° E.	N.	8. 2	1. 2	15	1. 25	. 00
4,000	71	S. 72° E.	S. 75° E.	7. 8	1. 0	13	−. 24	−. 92
3,000	102	S. 34° E.	S. 23° E.	7. 9	. 5	6	−. 49	−. 21
2,500	129	S. 38° E.	S. 15° E.	8. 2	1. 2	15	−1. 16	−. 31
2,000	147	S. 44° E.	S. 33° E.	7. 8	1. 8	23	−1. 53	−. 97
1,500	158	S. 40° E.	S. 29° E.	8. 0	1. 6	20	−1. 39	−. 78
1,000	175	S. 49° E.	S. 47° E.	7. 8	1. 7	22	−1. 18	−1. 26
750	186	S. 57° E.	S. 57° E.	8. 0	2. 0	25	−1. 09	−1. 68
500	194	S. 62° E.	S. 64° E.	8. 4	2. 9	35	−1. 29	−2. 59
250	206	S. 59° E.	S. 63° E.	7. 9	3. 9	49	−1. 74	−3. 48
Surface	208	S. 35° E.	S. 61° E.	4. 4	2. 6	59	−1. 23	−2. 23

THREE COLDEST MONTHS, JULY AUGUST, SEPTEMBER, COMBINED DATA, 1929 AND 1934

11,000	4	N. 24° E.	N. 15° E.	14. 2	10. 1	71	9. 83	−2. 58
10,000	7	N. 37° E.	N. 17° E.	9. 7	3. 6	37	3. 40	−1. 06
9,000	13	N. 24° W.	N. 43° W.	13. 4	5. 2	39	3. 80	3. 49
8,000	18	N. 28° W.	N. 35° W.	10. 1	4. 2	42	3. 47	2. 43
7,000	31	N. 49° W.	N. 67° W.	11. 1	4. 0	36	1. 58	3. 69
6,000	47	N. 41° W.	N. 63° W.	9. 8	3. 2	33	1. 46	2. 87
5,000	65	N. 33° W.	N. 52° W.	8. 7	1. 4	16	1. 07	1. 35
4,000	97	N. 75° W.	S. 89° W.	8. 7	1. 8	21	−. 04	1. 84
3,000	145	S. 76° W.	S. 67° W.	8. 0	1. 9	24	−. 73	1. 73
2,500	158	S. 59° W.	S. 52° W.	7. 8	2. 2	28	−1. 36	1. 75
2,000	173	S. 36° W.	S. 35° W.	7. 8	2. 7	35	−2. 19	1. 54
1,500	189	S. 30° W.	S. 30° W.	7. 7	3. 1	40	−2. 67	1. 54
1,000	204	S. 15° W.	S. 23° W.	8. 3	3. 7	34	−3. 46	1. 44
750	208	S. 11 W.	S. 20 W.	8. 4	4. 0	48	−3. 73	1. 35
500	221	S. 9° W.	S. 15° W.	8. 6	3. 9	45	−3. 74	. 99
250	225	S. 8° W.	S. 11° W.	7. 4	3. 6	48	−3. 57	. 71
Surface	227	S. 16° W.	S. 14° W.	3. 1	1. 5	48	−1. 50	. 37

LIGHT SEASON: OCTOBER, NOVEMBER, DECEMBER, JANUARY, FEBRUARY, MARCH—COMBINED DATA, 1929 AND 1934

11,000	5	N. 59° W.	N. 70° W.	9. 4	5. 5	59	1. 88	5. 14
10,000	22	N. 2° E.	N. 18° W.	8. 0	2. 4	30	2. 25	. 71
9,000	48	N. 25° E.	N. 12° E.	9. 9	2. 2	22	2. 12	−. 46
8,000	89	N. 4° W.	N. 60° W.	13. 7	3. 9	28	1. 91	3. 34
7,000	123	N. 23° W.	N. 73° W.	13. 2	3. 1	23	. 89	2. 92
6,000	159	N. 58° W.	N. 84° W.	11. 9	2. 2	18	. 22	2. 18
5,000	198	S. 51° W.	S. 68° W.	10. 5	1. 5	14	−. 55	1. 36
4,000	230	S. 6° W.	S. 21° W.	8. 3	1. 4	17	−1. 34	. 51
3,000	278	S. 9° E.	S. 1° W.	7. 4	1. 5	20	−1. 52	. 02
2,500	310	S. 16° E.	S. 15° E.	7. 0	1. 8	26	−1. 70	−. 45
2,000	346	S. 21° E.	S. 14° E.	7. 0	2. 3	33	−2. 18	−. 56
1,500	383	S. 26° E.	S. 16° E.	6. 9	2. 2	32	−2. 13	−. 63
1,000	426	S. 24° E.	S. 19° E.	6. 8	1. 6	24	−1. 55	−. 53
750	441	S. 31° E.	S. 24° E.	6. 9	1. 7	25	−1. 55	−. 68
500	459	S. 45° E.	S. 44° E.	7. 0	1. 9	27	−1. 38	−1. 33
250	474	S. 50° E.	S. 52° E.	6. 7	2. 8	42	−1. 70	−2. 17
Surface	482	S. 32° E.	S. 45° E.	4. 2	1. 9	45	−1. 38	−1. 37

TABLE 13.—*Results of pilot-balloon ascents at Little America by season and year, combined data, 1929 and 1934*—Continued

DARK SEASON: APRIL, MAY, JUNE, JULY, AUGUST, SEPTEMBER, COMBINED DATA, 1929 AND 1934

Altitude (m.)	Number of observations	Mean direction from	Resultant direction from	Mean velocity (m. p. s.)	Resultant velocity (m. p. s.)	Stability (percent)	Components of resultant velocity	
							N.-S. (m.p.s.)	E.-W. (m.p.s.)
11,000	4	N. 19° E.	N. 15° E.	14.2	10.2	72	9.82	−2.58
10,000	8	N. 24° E.	N. 9° E.	11.2	5.8	52	5.73	−.93
9,000	17	N. 16° W.	N. 56° W.	14.2	4.1	29	2.30	3.45
8,000	26	N. 8° W.	N. 55° W.	10.6	3.3	31	1.87	2.70
7,000	49	N. 23° W.	N. 51° W.	10.9	3.6	33	2.25	2.82
6,000	77	N. 23° W.	N. 49° W.	9.7	3.0	31	1.98	2.30
5,000	120	N. 18° W.	N. 52° W.	8.4	1.1	13	.66	.83
4,000	185	S. 17° E.	S. 58° W.	8.5	.5	6	−.27	.42
3,000	271	S. 12° W.	S. 31° W.	8.0	1.0	12	−.86	.51
2,500	315	S. 2° W.	S. 19° W.	7.8	1.4	18	−1.31	.45
2,000	358	S. 9° E.	S. 2° E.	7.8	1.9	24	−1.86	−.07
1,500	389	S. 9° E.	S. 1° E.	7.0	2.2	28	−2.24	−.04
1,000	428	S. 15° E.	S.	8.0	2.3	29	−2.34	−.19
750	442	S. 19° E.	S. 10° E.	8.1	2.4	30	−2.38	−.42
500	465	S. 24° E.	S. 20° E.	8.4	2.7	32	−2.54	−.94
250	483	S. 26° E.	S. 29° E.	7.6	3.0	39	−2.67	−1.47
Surface	487	S. 12° E.	S. 35° E.	3.8	1.6	42	−1.34	−.93
YEAR, 1929								
11,000	5	N. 17° E.	N. 30° E.	9.0	3.7	41	3.18	−1.80
10,000	20	N. 2° E.	N.	8.8	2.8	32	2.76	.02
9,000	44	N. 24° W.	N. 35° W.	12.2	3.2	26	2.58	1.81
8,000	69	N. 29° W.	N. 63° W.	14.4	5.3	37	2.39	4.77
7,000	91	N. 39° W.	N. 60° W.	13.9	5.1	37	2.52	4.39
6,000	115	N. 43° W.	N. 64° W.	13.3	4.5	34	1.98	4.07
5,000	143	N. 45° W.	N. 76° W.	11.4	2.9	25	.68	2.78
4,000	191	N. 63° W.	W.	9.0	1.5	17	.00	1.52
3,000	251	S. 68° W.	S. 74° W.	7.8	2.2	28	−.59	2.14
YEAR, 1929—Continued								
2,500	281	S. 29° W.	S. 38° W.	7.5	1.4	19	−1.11	.87
2,000	317	S. 3° E.	S. 3° W.	7.4	2.0	27	−2.00	.10
1,500	350	S. 7° E.	S. 1° W.	7.4	2.2	30	−2.24	.04
1,000	385	S. 7° E.	S. 1° W.	7.4	2.0	27	−2.03	.02
750	394	S. 13° E.	S. 10° E.	7.4	2.1	28	−2.10	−.37
500	403	S. 23° E.	S. 24° E.	7.5	2.3	31	−2.14	−.95
250	408	S. 27° E.	S. 34° E.	7.0	2.9	41	−2.34	−1.62
Surface	409	S. 17° E.	S. 36° E.	3.4	1.6	47	−1.27	−.91
YEAR, 1934								
11,000	4	N. 20° W.	N. 37° W.	14.8	10.2	69	8.20	6.10
10,000	10	N. 26° E.	N. 11° W.	9.0	4.1	46	4.01	.79
9,000	21	N. 74° E.	N. 57° E.	8.5	2.5	29	1.32	−2.07
8,000	46	N. 79° E.	N. 35° W.	10.9	1.4	13	1.16	.83
7,000	81	N. 77° E.	S. 85° W.	11.0	1.2	11	−.11	1.21
6,000	121	N. 40° E.	S. 55° W.	9.2	.6	7	−.33	.47
5,000	175	S. 38° E.	S. 13° E.	8.3	.7	8	−.73	−.16
4,000	224	S. 30° E.	S. 15° E.	7.9	1.7	22	−1.60	−.42
3,000	298	S. 16° E.	S. 19° E.	7.6	1.8	24	−1.70	−.58
2,500	344	S. 27° E.	S. 21° E.	7.3	2.0	27	−1.83	−.71
2,000	387	S. 24° E.	S. 18° E.	7.4	2.1	28	−2.03	−.65
1,500	422	S. 26° E.	S. 17° E.	7.3	2.2	30	−2.14	−.64
1,000	469	S. 29° E.	S. 20° E.	7.4	2.0	27	−1.88	−.67
750	489	S. 34° E.	S. 21° E.	7.6	2.0	26	−1.85	−.70
500	521	S. 43° E.	S. 35° E.	7.8	2.2	28	−1.83	−1.28
250	549	S. 42° E.	S. 43° E.	7.2	2.9	40	−2.08	−1.96
Surface	560	S. 25° E.	S. 43° E.	4.4	1.9	43	−1.43	−1.32

YEAR, COMBINED DATA, 1929 AND 1934

Altitude (m.)	Number of observations	Mean direction from	Resultant direction from	Mean velocity (m. p. s.)	Resultant velocity (m. p. s.)	Stability (percent)	Components of resultant velocity		Mean direction—resultant direction
							N.-S. (m. p. s.)	E.-W. (m. p. s.)	
13,000	3	N. 66° W.	N. 70° W.	17.7	5.6	32	1.90	5.27	19°
12,000	4	N. 19° W.	N. 7° W.	17.5	6.8	39	6.78	.85	−12°
11,000	9	N. 8° W.	N. 18° W.	11.6	5.7	49	5.41	1.71	10°
10,000	30	N. 8° E.	N. 5° W.	8.9	3.2	36	3.18	.27	13°
9,000	65	N. 12° E.	N. 14° W.	11.0	2.2	20	2.17	.56	26°
8,000	115	N. 10° W.	N. 59° W.	13.0	3.7	28	1.90	3.19	49°
7,000	172	N. 23° W.	N. 66° W.	12.5	3.2	26	1.28	2.89	43°
6,000	236	N. 37° W.	N. 70° W.	11.2	2.4	21	.79	2.22	33°
5,000	318	N. 55° W.	S. 85° W.	9.7	1.2	12	−.10	1.16	40°
4,000	415	S. 1° E.	S. 28° W.	8.4	1.0	12	−.86	.47	−29°
3,000	549	S.	S. 29° W.	7.7	1.4	18	−1.19	.66	−29°
2,500	625	S. 9° E.	S.	7.4	1.5	20	−1.51	.00	−9°
2,000	704	S. 17° E.	S. 9° E.	7.4	2.0	27	−2.01	−.31	−8°
1,500	772	S. 18° E.	S. 9° E.	7.3	2.2	30	−2.19	−.33	−9°
1,000	854	S. 20° E.	S. 10° E.	7.4	2.0	27	−1.95	−.36	−10°
750	883	S. 25° E.	S. 16° E.	7.5	2.0	27	−1.97	−.55	−9°
500	924	S. 34° E.	S. 30° E.	7.7	2.3	30	−1.97	−1.13	−4°
250	957	S. 35° E.	S. 40° E.	7.1	2.9	41	−2.19	−1.82	5°
Surface	969	S. 22° E.	S. 40° E.	4.0	1.8	45	−1.36	−1.15	18°

TABLE 14.—*Mean and maximum altitudes of the pilot-balloon ascents at Little America*

FOR THE DIFFERENT MONTHS, COMBINED DATA, 1929 AND 1934

Month	January 1929, 1930, 1935	February 1929, 1930	March 1929, 1934	April 1929, 1934	May 1929, 1934	June 1929, 1934	July 1929, 1934	August 1929, 1934	September 1929, 1934	October 1929, 1934	November 1929, 1934	December 1929, 1934	Year
Mean altitude (m.)	3, 644	4, 660	3, 845	3, 261	3, 103	3, 086	3, 178	3, 571	4, 914	4, 318	4, 298	4, 829	3, 890
Maximum altitude reached (m.)	10, 710	10, 890	9, 450	9, 810	9, 630	6, 750	9, 090	8, 730	13, 950	10, 170	13, 410	11, 250	13, 950
Number of ascents	110	38	32	104	77	79	83	67	77	85	118	113	983

MEAN ALTITUDE OF ASCENTS MADE DURING CLEAR WEATHER

Season	Summer	Fall	Winter	Spring	Year
Mean altitude (m.)	7, 078	4, 882	3, 982	6, 223	5, 343
Number of ascents	50	59	107	98	314

TABLE 15.—*Percentage frequency of the different wind directions at standard levels, by seasons and year, combined data, 1929 and 1934*

SUMMER, COMBINED DATA

Altitude (m.)	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Total number of observations
10,000	15. 4	23. 1	15. 4	7. 7	0. 0	0. 0	7. 7	[30. 8]	0. 0	13
9,000	[26. 0]	18. 0	12. 0	8. 0	. 0	8. 0	8. 0	20. 0	. 0	25
8,000	15. 6	14. 6	13. 6	9. 4	3. 1	9. 4	15. 6	[18. 7]	. 0	48
7,000	11. 6	11. 5	15. 2	13. 7	4. 3	11. 6	15. 1	[16. 6]	. 0	69
6,000	10. 5	10. 8	12. 5	15. 8	5. 5	10. 9	16. 3	[17. 4]	. 0	92
5,000	11. 5	9. 7	12. 8	[16. 5]	6. 9	12. 0	16. 0	14. 7	. 0	109
4,000	7. 2	7. 6	14. 0	[17. 2]	10. 4	12. 0	15. 2	16. 4	. 0	125
3,000	5. 9	6. 5	17. 9	[18. 6]	12. 8	12. 0	13. 0	12. 8	. 0	145
2,500	4. 5	7. 9	18. 0	[19. 3]	17. 4	13. 5	14. 4	5. 1	. 0	156
2,000	4. 0	8. 6	17. 3	[20. 9]	18. 4	14. 0	11. 8	4. 8	. 0	174
1,500	4. 5	11. 7	13. 5	[22. 5]	21. 6	11. 5	10. 5	4. 0	. 0	196
1,000	5. 3	12. 5	10. 8	[22. 1]	20. 3	11. 9	11. 7	5. 2	. 0	219
750	6. 9	11. 3	12. 6	[24. 2]	16. 1	12. 8	9. 9	6. 0	. 4	227
500	6. 4	13. 7	15. 2	[23. 5]	15. 2	13. 1	6. 9	5. 7	. 0	236
250	6. 6	11. 7	18. 9	[22. 4]	19. 5	13. 2	4. 6	2. 6	. 4	247
Surface	4. 4	8. 7	[27. 4]	15. 0	20. 4	16. 3	4. 8	2. 4	. 8	252

AUTUMN, COMBINED DATA

9,000	[40. 0]	20. 0	10. 0	10. 0	0. 0	20. 0	0. 0	0. 0	0. 0	5
8,000	[35. 0]	10. 0	15. 0	5. 0	10. 0	15. 0	5. 0	5. 0	. 0	10
7,000	[37. 5]	17. 5	15. 0	2. 5	. 0	7. 5	12. 5	7. 5	. 0	20
6,000	[21. 0]	19. 4	12. 9	8. 1	3. 2	6. 4	17. 8	11. 3	. 0	31
5,000	13. 6	16. 7	[16. 8]	16. 6	2. 1	11. 5	12. 5	10. 4	. 0	48
4,000	9. 8	16. 2	[18. 3]	16. 9	9. 1	13. 3	11. 2	4. 9	. 0	71
3,000	6. 8	12. 8	14. 2	[20. 5]	11. 3	17. 1	8. 8	8. 3	. 0	102
2,500	7. 1	12. 8	15. 9	[19. 8]	11. 7	18. 7	7. 0	7. 3	. 0	129
2,000	7. 4	15. 9	13. 6	[19. 0]	16. 7	14. 3	7. 5	4. 8	. 7	147
1,500	6. 4	15. 2	13. 3	[17. 8]	[17. 7]	13. 0	7. 3	9. 5	. 0	158
1,000	9. 7	14. 6	13. 9	[20. 3]	15. 4	12. 9	8. 0	4. 0	1. 1	175
750	8. 6	15. 9	13. 7	[22. 0]	14. 2	11. 2	7. 3	6. 9	. 0	186
500	8. 4	15. 2	16. 3	[24. 4]	11. 8	10. 6	7. 2	5. 5	. 5	194
250	6. 6	12. 6	[24. 1]	23. 8	15. 2	9. 5	5. 8	2. 5	. 0	206
Surface	2. 1	5. 2	[30. 3]	15. 9	20. 6	19. 4	2. 9	. 0	3. 4	208

WINTER, COMBINED DATA

8,000	16. 6	16. 7	0. 0	0. 0	16. 6	[33. 3]	16. 7	0. 0	0. 0	3
7,000	13. 6	13. 7	. 0	18. 2	9. 1	13. 6	9. 1	[22. 8]	. 0	11
6,000	16. 7	14. 6	. 0	8. 3	10. 4	16. 7	14. 6	[18. 8]	. 0	24
5,000	11. 9	9. 7	8. 7	8. 7	13. 0	14. 1	[18. 5]	15. 2	. 0	46
4,000	13. 0	11. 7	12. 3	10. 5	13. 6	11. 1	[16. 6]	11. 1	. 0	81
3,000	11. 1	11. 5	8. 9	13. 0	12. 2	[16. 6]	13. 7	13. 0	. 0	135
2,500	9. 6	10. 0	12. 0	12. 0	12. 3	[16. 0]	[16. 0]	12. 0	. 0	150
2,000	9. 3	9. 9	13. 3	12. 5	15. 8	[17. 8]	11. 7	9. 9	. 0	168
1,500	8. 0	8. 9	15. 6	14. 2	15. 8	[17. 8]	13. 2	6. 5	. 0	186
1,000	6. 1	10. 4	12. 0	15. 5	[23. 6]	15. 8	12. 4	4. 3	. 0	206
750	6. 3	10. 0	12. 6	16. 4	[24. 4]	13. 8	12. 6	4. 0	. 0	211
500	6. 1	10. 9	11. 9	18. 1	[22. 7]	14. 9	11. 1	4. 4	. 0	221
250	5. 3	7. 8	15. 2	17. 2	[25. 2]	18. 7	7. 2	3. 5	. 0	228
Surface	2. 4	6. 1	16. 8	11. 9	20. 8	[28. 1]	5. 1	1. 5	7. 4	229

TABLE 15.—*Percentage frequency of the different wind directions at standard levels, by seasons and year, combined data, 1929 and 1934*—Con.

THREE COLDEST MONTHS (JULY, AUGUST, SEPTEMBER), COMBINED DATA

Altitude (m.)	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Total number of observations
10,000	21.4	7.1	28.6	14.3	0.0	0.0	7.2	21.4	0.0	7
9,000	27.0	19.2	.0	7.7	3.8	7.7	19.2	15.4	.0	13
8,000	22.2	13.9	8.3	5.6	5.6	11.1	13.9	19.4	.0	18
7,000	14.5	16.1	3.2	11.3	4.8	12.9	19.4	17.8	.0	31
6,000	18.1	16.0	5.3	5.3	11.7	10.6	16.0	17.0	.0	47
5,000	15.4	15.4	8.5	9.2	11.5	6.9	18.5	14.6	.0	65
4,000	13.9	10.8	10.3	9.3	13.4	11.3	18.6	12.4	.0	97
3,000	10.7	10.3	8.3	8.6	12.8	19.0	15.5	14.1	.7	145
2,500	9.2	8.2	8.6	10.1	14.2	19.3	17.4	13.0	.0	158
2,000	7.5	5.5	9.6	11.3	17.3	24.0	14.4	10.4	.0	173
1,500	7.1	5.8	8.8	12.7	18.5	23.8	14.3	9.0	.0	189
1,000	4.7	5.9	9.1	12.7	27.7	19.6	14.9	5.4	.0	204
750	4.6	4.6	9.6	14.2	28.8	19.0	13.9	5.3	.0	208
500	4.5	5.0	9.8	16.3	26.2	19.2	12.4	6.6	.0	221
250	4.0	3.6	10.2	16.5	26.2	24.2	10.0	5.3	.0	225
Surface	2.7	3.1	10.1	10.1	22.9	36.6	7.3	1.5	5.7	227

SPRING, COMBINED DATA

10,000	9.3	9.3	[28.1]	9.3	0.0	3.1	15.5	25.1	0.0	16
9,000	13.3	13.2	[16.2]	14.8	4.3	8.8	14.7	14.6	.0	34
8,000	10.2	11.1	[21.4]	11.1	1.9	9.3	20.4	14.9	.0	54
7,000	8.4	12.4	12.5	13.2	4.9	11.2	[22.2]	15.4	.0	72
6,000	10.7	11.9	14.1	9.5	6.8	12.9	[19.1]	15.1	.0	89
5,000	8.7	13.9	14.0	13.5	9.1	13.4	[16.5]	10.9	.0	115
4,000	6.5	7.9	17.4	14.2	11.2	14.8	[18.1]	9.8	.0	138
3,000	7.5	6.6	14.7	14.7	15.3	[17.4]	15.0	8.4	.6	167
2,500	6.3	8.0	13.6	17.2	15.2	[17.4]	13.4	8.9	.0	190
2,000	5.6	7.0	13.7	[18.6]	16.7	18.1	12.5	7.2	.5	215
1,500	5.9	5.6	13.4	19.2	[19.6]	15.1	11.6	9.2	.4	232
1,000	7.7	6.9	12.0	18.9	[20.7]	14.3	11.5	7.2	.8	254
750	8.1	8.0	10.6	20.1	[20.4]	13.8	11.4	7.7	.0	259
500	9.3	7.0	13.6	[20.3]	16.9	15.2	9.9	8.0	.0	273
250	4.5	8.8	18.4	[18.9]	[18.8]	16.2	10.1	4.5	.0	276
Surface	2.9	3.9	20.2	14.0	19.3	[27.6]	7.0	1.4	3.6	280

LIGHT SEASON, COMBINED DATA

10,000	9.1	18.2	20.4	6.8	0.0	2.2	13.6	[29.5]	0.0	22
9,000	[17.6]	15.6	[17.7]	12.5	2.1	8.3	9.4	16.6	.0	48
8,000	12.3	13.0	[18.5]	10.6	2.2	9.5	[18.6]	15.2	.0	89
7,000	10.6	11.8	15.0	14.2	4.8	11.0	[18.3]	14.2	.0	123
6,000	9.8	11.3	13.5	14.2	4.9	12.9	[18.9]	14.4	.0	159
5,000	9.6	11.7	13.5	15.6	7.6	13.6	[16.7]	11.9	.0	198
4,000	6.3	8.9	[16.1]	[16.1]	10.5	13.3	[15.9]	13.1	.0	230
3,000	6.5	6.5	17.0	[17.9]	13.5	13.3	14.1	11.3	.0	278
2,500	5.0	7.7	17.1	[18.8]	15.7	13.9	13.9	7.7	.0	310
2,000	4.9	8.8	16.1	[20.5]	17.1	13.9	12.4	6.2	.3	346
1,500	5.4	9.3	14.3	[21.8]	19.9	10.6	11.4	7.1	.3	383
1,000	6.6	10.9	11.7	[22.1]	18.3	11.9	11.6	6.5	.5	425
750	7.9	10.8	12.2	[23.2]	16.2	11.8	10.7	6.9	.2	441
500	8.3	12.0	15.1	[22.9]	14.7	12.4	8.3	6.3	.0	459
250	6.0	11.6	20.4	[21.6]	17.9	12.3	7.0	3.0	.2	474
Surface	3.3	7.0	[26.6]	14.9	19.2	19.4	5.6	1.7	2.3	482

DARK SEASON, COMBINED DATA

10,000	[31.2]	6.3	25.0	12.5	0.0	0.0	6.2	18.8	0.0	8
9,000	[29.3]	17.7	2.9	8.9	2.9	11.8	14.8	11.8	.0	17
8,000	[25.0]	12.6	12.5	6.3	6.3	10.4	10.4	16.7	.0	24
7,000	[20.3]	15.4	8.1	8.2	3.0	11.2	15.4	18.4	.0	49
6,000	[18.9]	15.6	8.4	6.5	8.5	9.1	14.3	[18.8]	.0	77
5,000	13.0	13.3	12.9	12.1	8.4	11.2	[15.0]	14.2	.0	120
4,000	11.4	11.3	14.9	13.2	11.9	12.6	[15.7]	8.9	.0	185
3,000	9.2	11.4	10.9	14.9	12.7	[18.3]	12.2	10.0	.5	271
2,500	8.5	11.2	12.4	15.1	13.0	[18.8]	12.1	9.1	.0	315
2,000	7.9	11.1	12.9	15.2	16.8	[18.6]	9.9	7.3	.3	358
1,500	6.9	10.6	13.5	15.5	17.7	[18.2]	10.1	7.7	.0	389
1,000	7.6	10.7	12.4	16.2	[22.0]	15.6	10.5	4.3	.5	428
750	7.1	11.1	12.3	18.0	[21.7]	14.1	10.1	5.6	.0	442
500	6.9	10.8	13.2	[20.2]	18.8	14.9	9.5	5.6	.2	465
250	5.4	8.7	17.4	19.3	[21.6]	16.8	7.1	3.8	.0	483
Surface	2.7	4.9	20.2	13.4	21.3	[26.7]	4.5	1.0	5.1	487

TABLE 15.—*Percentage frequency of the different wind directions at standard levels, by season and year, combined data, 1929 and 1934*—Con.

YEAR 1929 ONLY

Altitude (m.)	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Total number of observations
10,000	10.0	20.0	22.5	2.5	0.0	2.5	12.5	30.0	0.0	20
9,000	22.8	18.2	9.1	5.7	3.4	10.2	12.5	18.1	.0	44
8,000	15.9	15.9	10.8	6.5	1.4	10.8	20.4	18.1	.0	69
7,000	14.3	16.5	8.3	7.1	2.8	11.6	23.1	16.5	.0	91
6,000	12.5	14.3	9.2	6.5	7.0	9.6	20.4	20.5	.0	115
5,000	12.6	13.3	10.5	11.2	5.6	14.0	16.4	16.5	.0	143
4,000	10.2	10.8	12.6	9.4	9.2	12.9	16.8	18.3	.0	191
3,000	8.8	9.2	13.2	9.6	11.8	17.4	15.0	15.4	.0	251
2,500	6.2	10.7	14.4	9.9	13.7	19.2	15.9	9.8	.0	281
2,000	6.2	10.5	15.0	13.3	16.9	17.6	12.7	7.9	.0	317
1,500	7.5	7.8	14.6	16.1	18.3	15.2	13.0	7.4	.0	350
1,000	6.0	9.9	10.9	19.6	18.7	15.4	13.2	6.1	.3	385
750	7.1	10.0	11.4	20.2	18.2	14.9	12.5	5.5	.3	394
500	7.2	9.8	13.7	21.5	16.7	15.7	10.2	5.2	.0	403
250	4.7	9.0	17.1	21.9	19.8	15.5	8.5	3.3	.2	408
Surface	1.6	5.5	22.6	12.8	18.6	23.4	5.9	1.8	7.6	409

YEAR 1934 ONLY

10,000	25.0	5.0	20.0	20.0	0.0	0.0	10.0	20.0	.0	10
9,000	16.6	12.0	23.8	23.9	.0	7.2	7.2	9.5	.0	21
8,000	13.0	7.7	26.1	14.1	6.4	9.7	12.0	10.8	.0	46
7,000	12.3	8.6	18.5	18.5	6.2	10.5	11.1	14.2	.0	81
6,000	12.9	11.1	14.5	16.5	5.5	13.6	14.5	11.5	.0	121
5,000	9.4	11.4	15.5	16.8	9.7	11.8	15.7	9.7	.0	175
4,000	7.1	9.4	18.1	19.4	12.8	13.1	15.0	5.2	.0	224
3,000	7.0	8.8	14.7	22.2	14.3	14.4	11.6	6.8	.3	298
2,500	7.3	8.3	15.1	22.8	14.9	14.0	10.6	7.3	.0	344
2,000	6.7	9.4	14.1	21.6	16.9	15.2	9.8	5.8	.5	387
1,500	5.1	11.5	13.4	20.5	20.3	13.6	9.0	7.3	.2	422
1,000	8.0	11.5	13.0	18.8	21.4	12.3	9.4	4.8	.6	469
750	7.8	11.6	12.9	21.0	19.6	11.3	8.8	6.9	.0	489
500	8.0	12.6	14.6	21.5	16.8	12.1	7.7	6.6	.2	521
250	6.4	11.1	20.2	19.4	19.8	13.7	6.1	3.4	.0	549
Surface	3.9	6.2	24.0	15.2	21.4	22.7	4.5	1.1	.9	560

YEAR, COMBINED DATA, 1929 AND 1934

10,000	15.1	15.0	21.6	8.4	0.0	1.6	11.6	[26.7]	0.0	30
9,000	[20.7]	16.1	13.8	11.6	2.2	9.3	10.7	15.5	.0	65
8,000	14.8	12.6	[17.0]	9.5	3.5	10.4	[17.0]	15.2	.0	115
7,000	13.4	12.8	13.0	12.5	4.3	11.1	[17.4]	15.5	.0	172
6,000	12.8	12.7	11.8	11.7	6.2	11.6	[17.4]	15.8	.0	236
5,000	10.8	12.3	13.2	14.3	7.9	12.8	[16.0]	12.7	.0	318
4,000	8.6	10.0	[15.6]	14.8	10.9	13.0	[15.8]	11.2	.0	415
3,000	7.8	8.9	14.1	[16.5]	13.1	15.8	13.1	10.6	.2	549
2,500	6.7	9.5	14.8	[16.9]	14.3	16.4	12.9	8.4	.0	625
2,000	6.4	10.0	14.5	[17.8]	16.9	16.2	11.1	6.8	.3	704
1,500	6.1	9.8	13.9	18.0	[18.4]	14.4	10.8	7.3	1.3	772
1,000	7.1	10.8	12.0	19.2	[20.2]	13.8	10.6	5.4	.5	854
750	7.5	10.8	12.2	[20.7]	19.0	13.0	10.5	6.2	.1	883
500	7.6	11.4	14.2	[21.4]	16.8	13.6	8.8	6.1	.1	924
250	5.7	10.1	18.9	[20.4]	19.7	14.6	7.1	3.4	.1	957
Surface	3.0	5.9	[23.5]	14.2	20.0	23.1	5.1	1.3	3.7	969
All wind observations	4.8	5.0	[32.1]	8.3	21.8	16.7	8.0	1.1	1.4	----

TABLE 16.—*Smoothed values of mean velocity with different wind directions at standard levels*

LIGHT SEASON, COMBINED DATA, 1929 AND 1934

[Meters per second]

Altitude (m.)	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Altitude (m.)	N.	NE.	E.	SE.	S.	SW.	W.	NW.
10,000	7.3	6.4	7.5	7.1	5.9	[14.2]	11.9	8.1	3,000	6.5	6.7	7.2	7.1	7.7	[8.4]	7.7	6.9
9,000	8.9	8.9	9.2	9.8	11.4	[11.7]	10.8	9.5	2,500	6.6	7.1	7.1	6.8	6.9	7.1	6.7	6.4
8,000	11.5	12.3	17.7	12.9	10.7	15.3	[19.0]	15.0	2,000	5.9	6.7	6.8	6.9	7.4	[8.0]	7.1	6.0
7,000	11.9	10.6	10.1	9.9	10.4	14.9	[17.8]	14.4	1,500	6.4	6.7	6.3	6.6	7.5	[8.1]	7.0	6.2
6,000	10.5	9.7	9.5	9.0	9.7	13.6	[14.6]	12.1	1,000	7.4	[7.7]	7.5	6.7	6.8	7.2	7.2	6.9
5,000	9.1	8.8	9.6	9.4	9.5	12.1	[12.7]	10.3	500	6.3	6.9	7.3	6.9	6.8	[7.5]	7.2	6.3
4,000	7.1	7.1	7.9	8.5	8.9	[9.9]	9.1	7.4	Surface	4.2	4.7	[5.0]	4.5	3.9	3.7	3.3	3.5

DARK SEASON, COMBINED DATA, 1929 AND 1934

[Meters per second]

9,000	11.5	11.8	12.6	17.3	[24.4]	22.2	16.1	11.8	2,500	8.1	7.7	7.0	7.1	8.2	[8.9]	7.9	7.3
8,000	9.6	9.7	7.9	5.9	8.1	[14.6]	14.2	11.2	2,000	7.2	7.4	7.5	7.5	8.1	[8.4]	7.7	7.5
7,000	8.1	8.7	10.6	10.0	7.9	11.8	[15.0]	12.4	1,500	6.6	7.3	7.3	7.4	8.5	[8.7]	7.2	6.6
6,000	8.2	8.4	7.8	7.9	8.8	10.6	[13.7]	10.7	1,000	7.9	7.8	7.1	7.3	8.4	[8.9]	8.0	7.6
5,000	7.9	8.4	6.7	5.5	8.0	9.6	[9.8]	8.4	500	7.5	8.0	8.4	8.5	[9.0]	8.9	8.0	7.5
4,000	8.4	8.4	7.5	7.5	8.5	9.0	[9.1]	8.5	Surface	[5.5]	[5.5]	5.1	4.2	3.5	3.3	2.9	3.3
3,000	8.4	8.2	7.5	7.1	8.1	[8.6]	8.4	8.0									

YEAR, COMBINED DATA, 1929 AND 1934

[Meters per second]

9,000	9.8	9.7	9.7	12.4	[17.0]	14.9	12.3	10.2	2,500	7.5	7.5	7.1	7.0	7.5	[8.1]	7.3	6.9
8,000	10.7	11.3	15.1	11.2	9.7	15.2	[18.3]	14.1	2,000	6.7	7.1	7.1	7.2	7.8	[8.3]	7.4	6.8
7,000	10.3	9.9	10.2	10.0	9.9	14.1	[17.1]	13.8	1,500	6.5	7.0	6.8	7.0	8.0	[8.4]	7.1	6.4
6,000	9.4	9.2	9.1	8.8	9.6	12.9	[14.3]	11.4	1,000	7.7	7.6	6.8	6.8	7.7	[8.2]	7.7	7.2
5,000	8.5	8.6	8.6	8.2	9.1	11.2	[11.6]	9.5	500	6.9	7.5	7.8	7.7	8.0	[8.3]	7.6	6.9
4,000	7.8	7.8	7.8	8.1	8.7	[9.5]	9.1	7.9	Surface	4.8	[5.0]	[5.0]	4.4	3.7	3.5	3.1	3.5
3,000	7.6	7.6	7.4	7.1	7.9	[8.4]	8.0	7.4									

TABLE 17.—*Mean turning of the wind from the surface up to given leves with the different surface wind directions, year, combined data, 1929 and 1934*

Altitude (m.)	Direction at surface from—															
	North		Northeast		East		Southeast		South		Southwest		West		Northwest	
	Mean turning	Number of observations	Mean turning	Number of observations	Mean turning	Number of observations	Mean turning	Number of observations	Mean turning	Number of observations	Mean turning	Number of observations	Mean turning	Number of observations	Mean turning	Number of observations
	°		°		°		°		°		°		°		°	
9,990					−2.0	6	−0.1	4	−43.5	4	−25.6	8				
8,910					−6.2	13	−28.1	5	−51.5	14	−16.8	19	−17.4	5		
8,010					−7.2	22	−27.3	12	−48.7	26	−14.9	27	−21.6	7		
6,930					−12.8	35	−27.3	21	−48.5	42	−5.1	36	−15.9	9		
6,030					−10.9	54	−27.6	27	−48.6	58	−9.4	56	−12.1	11		
4,950	−9.1	2	−41.3	4	−13.4	70	−24.5	38	−48.8	88	−12.4	82	−13.9	15	−64.9	3
4,590	−15.6	2	−41.5	5	−17.6	75	−19.6	42	−44.9	90	−10.6	96	−13.3	18	−55.2	3
4,050	−14.1	2	−33.9	9	−18.6	82	−17.6	49	−44.4	100	−9.7	115	−14.4	19	−53.2	3
3,510	−4.1	3	−35.8	14	−23.6	96	−22.4	55	−42.9	116	−8.7	137	−9.3	24	−51.9	3
2,970	−44.1	5	−32.0	23	−25.3	122	−22.5	64	−39.1	128	−11.8	157	−9.3	27	−50.2	5
2,430	−44.3	6	−33.8	28	−19.3	142	−23.5	79	−45.0	142	−14.4	178	−15.7	29	−52.8	5
2,070	−42.8	9	−39.0	29	−21.3	156	−23.8	84	−41.8	149	−17.1	189	−18.8	35	−49.0	6
1,890	−46.8	12	−40.7	31	−23.0	164	−23.2	88	−40.9	152	−16.0	196	−19.3	36	−49.0	6
1,710	−47.3	15	−47.4	32	−23.8	170	−21.8	93	−39.0	157	−14.9	203	−17.5	36	−48.0	7
1,530	−35.1	16	−48.2	35	−22.7	178	−19.1	96	−36.4	163	−15.3	208	−13.8	37	−44.3	8
1,350	−34.5	17	−45.0	35	−22.5	193	−15.4	101	−35.1	171	−16.2	211	−15.2	39	−41.3	9
1,170	−35.1	18	−42.5	37	−22.1	204	−13.3	102	−32.8	176	−16.6	214	−17.0	39	−37.0	9
990	−36.0	21	−40.1	41	−22.3	217	−12.6	106	−30.9	188	−16.4	216	−14.4	41	−35.3	9
801	−28.9	26	−37.2	42	−21.9	230	−10.0	107	−32.5	185	−17.2	218	−15.2	42	−27.4	12
612	−23.3	29	−37.6	47	−21.5	239	−7.4	111	−34.4	188	−17.4	222	−15.1	43	−27.2	12
414	−18.7	30	−33.8	52	−19.0	254	−7.8	115	−33.1	192	−18.4	227	−14.7	43	−32.9	12
216	−14.7	30	−18.8	54	−8.6	257	−4.7	120	−25.9	196	−17.9	232	−15.6	44	−30.4	12
Surface	0	30	0	54	0	257	0	120	0	196	0	232	0	44	0	12

NOTE.—Clockwise turning is positive; counterclockwise turning is negative.

TABLE 18.—*Mean turning of the wind from the surface up to given levels, regardless of the direction of the surface wind, combined data, 1929 and 1934.*

Altitude (m).	Light season		Dark season		Year		Altitude (m).	Light season		Dark season		Year	
	Mean turning from surface	Number of observations	Mean turning from surface	Number of observations	Mean turning from surface	Number of observations		Mean turning from surface	Number of observations	Mean turning from surface	Number of observations	Mean turning from surface	Number of observations
	°		°		°			°		°		°	
11,970					−19.8	4	2,070	−24.0	331	−29.9	326	−26.9	657
11,070					−19.3	7	1,890	−24.4	347	−29.5	338	−26.9	685
9,990	−13.9	17	−35.4	6	−20.2	23	1,710	−23.5	365	−29.3	348	−26.3	713
8,910	−22.5	43	−36.1	14	−26.8	57	1,530	−21.6	374	−28.1	365	−24.8	739
8,010	−21.4	74	−35.7	22	−25.8	96	1,350	−21.2	393	−27.0	383	−24.0	776
6,930	−20.6	110	−28.8	35	−23.7	145	1,170	−20.3	408	−26.4	391	−23.3	799
6,030	−21.6	143	−27.5	67	−24.1	210	990	−19.4	425	−25.7	404	−22.5	829
4,950	−23.7	187	−26.7	110	−25.3	297	801	−19.6	443	−25.1	419	−22.3	862
4,590	−22.2	199	−25.7	132	−23.9	331	612	−20.0	454	−24.3	437	−22.1	891
4,050	−21.7	219	−25.2	160	−23.4	379	414	−19.4	470	−22.9	455	−21.1	925
3,510	−22.3	251	−26.0	197	−24.1	448	216	−13.6	483	−17.2	462	−15.3	945
2,970	−23.2	278	−26.2	253	−24.7	531	Surface	0	483	0	462	0	945
2,430	−22.2	310	−30.0	299	−26.0	609							

NOTE.—Clockwise turning is positive; counterclockwise turning is negative.

TABLE 19.—*Mean velocity and mean turning of the wind in the lowest layer with the different surface wind directions computed from selected pilot-balloon ascents, combined data, 1929 and 1934*

Altitude (m.)	Surface wind from south			Surface wind from southwest			Surface wind from west		
	Number of observations	Velocity	Turning	Number of observations	Velocity	Turning	Number of observations	Velocity	Turning
		M. p. s.	°		M. p. s.	°		M. p. s.	°
Surface	99	3.14	0.0	113	3.92	0.0	29	3.26	0.0
216	99	6.26	−37.0	113	8.17	−33.4	29	7.72	−30.4
414	99	7.39	−48.1	112	9.91	−43.0	29	10.48	−32.2
612	98	7.56	−50.5	111	10.18	−42.3	29	11.57	−34.6
801	95	7.25	−47.2	108	9.57	−42.3	29	12.03	−34.4
990	94	7.44	−47.2	108	9.30	−42.6	29	11.72	−33.0
1,170	93	7.45	−47.2	106	8.92	−43.0	28	11.18	−31.4
1,350	91	7.43	−50.2	106	8.98	−44.3	28	11.07	−27.4
1,530	87	7.18	−52.2	104	8.93	−42.7	26	11.12	−26.9
1,710	82	6.94	−51.3	101	8.73	−41.6	25	11.27	−27.0
1,890	79	6.90	−51.1	97	8.73	−41.7	25	11.61	−28.1

Altitude (m.)	Surface wind from northwest			Surface wind from north			Surface wind from northeast		
	Number of observations	Velocity	Turning	Number of observations	Velocity	Turning	Number of observations	Velocity	Turning
		M. p. s.	°		M. p. s.	°		M. p. s.	°
Surface	11	2.94	0.0	18	4.76	0.0	34	4.44	0.0
216	11	6.54	−32.9	18	7.98	−7.1	34	7.39	−36.9
414	11	8.86	−40.4	18	9.13	−12.8	34	7.90	−44.5
612	11	10.04	−37.7	18	9.78	−17.4	32	8.01	−51.3
801	11	11.08	−38.6	17	9.84	−23.1	30	7.82	−53.8
990	9	11.24	−47.9	15	10.51	−26.8	29	7.84	−50.0
1,170	9	9.71	−48.1	14	9.94	−22.9	26	7.69	−50.8
1,350	9	9.84	−41.2	12	10.22	−36.9	25	7.70	−48.9
1,530	8	9.44	−47.5	11	10.35	−38.7	22	7.84	−46.8
1,710	7	8.63	−56.6	10	10.27	−38.3	21	8.15	−49.3
1,890	6	9.07	−48.3	9	10.06	−40.8	20	8.42	−51.0

Altitude (m.)	Surface wind from east			Surface wind from southeast			Surface wind from calm		
	Number of observations	Velocity	Turning	Number of observations	Velocity	Turning	Number of observations	Velocity	Turning
		M. p. s.	°		M. p. s.	°		M. p. s.	°
Surface	79	6.00	0.0	42	4.12	0.0	3	0.0	0.0
216	79	8.56	−29.3	42	8.47	−27.3	3	3.57	−13.7
414	79	8.96	−51.1	42	8.83	−38.5	3	5.47	−30.7
612	75	8.76	−53.5	40	8.38	−41.1	3	5.50	−44.3
801	71	8.98	−55.2	38	7.99	−40.6	3	4.83	−40.3
990	67	9.24	−56.9	38	7.60	−42.7	3	3.87	−50.0
1,170	62	9.39	−55.5	38	7.40	−44.3	3	3.67	−51.0
1,350	58	9.42	−54.5	38	7.34	−43.9	3	4.03	−56.3
1,530	55	9.28	−52.8	36	7.76	−37.8	3	4.30	−68.7
1,710	52	9.35	−50.6	35	7.89	−41.8	3	4.43	−77.7
1,890	48	8.97	−51.9	31	7.80	−45.0	3	4.67	−85.3

NOTE.—Clockwise turning is positive; counter clockwise turning is negative.

TABLE 20.—*Mean velocity and mean turning of the wind in the lowest layer regardless of the surface wind direction, selected ascents combined data, 1929 and 1934*

Altitude (m.)	Light season, combined data			Dark season, combined data			Year, combined data		
	Number of observations	Velocity	Turning	Number of observations	Velocity	Turning	Number of observations	Velocity	Turning
		M. p. s.	°		*M. p. s.*	°		*M. p. s.*	°
Surface	203	4. 23	0. 0	225	4. 03	0. 0	428	4. 13	0. 0
216	203	7. 02	−28. 4	225	8. 00	−34. 6	428	7. 53	−31. 7
414	203	7. 93	−39. 7	224	10. 09	−46. 5	427	8. 84	−43. 3
612	202	8. 15	−41. 5	215	9. 37	−48. 4	417	8. 78	−45. 0
801	197	8. 14	−41. 7	205	9. 48	−48. 5	402	8. 83	−45. 1
990	190	8. 14	−41. 7	202	9. 33	−48. 8	392	8. 75	−45. 3
1,170	184	8. 06	−41. 5	195	9. 02	−48. 6	379	8. 56	−45. 2
1,350	179	8. 04	−41. 3	191	9. 02	−50. 9	370	8. 52	−46. 3
1,530	170	8. 10	−40. 7	182	9. 05	−50. 3	352	8. 59	−45. 7
1,710	165	7. 92	−41. 5	171	8. 99	−48. 9	336	8. 46	−45. 3
1,890	156	7. 88	−43. 8	162	9. 01	−48. 6	318	8. 46	−46. 2

NOTE.—Clockwise turning is positive; counter clockwise turning is negative.

TABLE 21.—*Mean velocity and mean turning of the wind in the lowest layer with low and high surface wind velocities, selected ascents combined data, 1929 and 1934*

Altitude (m.)	Velocities<3.6 m. p. s.			Velocities≥3.6 m. p. s.		
	Number of observations	Velocity	Turning	Number of observations	Velocity	Turning
		M. p. s.	°		*M. p. s.*	°
Surface	207	2. 22	0. 0	221	5. 92	0. 0
216	207	5. 74	−40. 5	221	9. 21	−23. 3
414	206	7. 02	−52. 6	221	10. 53	−34. 6
612	204	7. 42	−53. 4	213	10. 07	−37. 0
801	202	7. 33	−51. 8	200	10. 33	−38. 4
990	196	7. 32	−51. 2	196	10. 19	−39. 5
1,170	191	7. 23	−50. 8	188	9. 90	−39. 4
1,350	187	7. 39	−52. 3	183	9. 71	−40. 2
1,530	180	7. 46	−50. 8	172	9. 78	−40. 3
1,710	175	7. 18	−52. 5	161	9. 86	−37. 4
1,890	166	7. 54	−52. 6	152	9. 46	−39. 2

NOTE.—Clockwise turning is positive; counter clockwise turning is negative.

TABLE 22.—*Direction and velocity at upper levels with the different wind directions at the surface—year, combined data, 1929 and 1934*

SURFACE DIRECTION FROM SOUTH

Altitude, (m.)	Number of observations	Mean direction from—	Resultant direction from—	Mean velocity (m.p.s.)	Resultant velocity (m.p.s.)	Stability (percent)
10,000	6	N. 15° W.	N. 28° W.	8. 8	6. 8	78
9,000	14	N. 17° W.	N. 8° E.	9. 8	5. 9	60
8,000	31	N. 35° W.	N. 51° W.	13. 2	4. 9	37
7,000	49	N. 31° W.	N. 55° W.	12. 7	4. 3	34
6,000	64	N. 34° W.	N. 53° W.	10. 6	1. 8	17
5,000	83	S. 31° E.	N. 24° W.	9. 1	0. 1	1
4,000	105	S. 46° E.	S. 17° E.	7. 8	1. 4	18
3,000	128	S. 27° E.	S. 13° E.	7. 0	2. 0	29
2,500	141	S. 31° E.	S. 21° E.	6. 7	2. 6	39
2,000	150	S. 32° E.	S. 22° E.	6. 7	3. 4	51
1,500	165	S. 31° E.	S. 28° E.	6. 5	4. 1	63
1,000	176	S. 25° E.	S. 28° E.	6. 6	4. 1	62
750	183	S. 28° E.	S. 30° E.	6. 5	4. 1	63
500	186	S. 33° E.	S. 36° E.	6. 6	4. 5	68
250	193	S. 26° E.	S. 30° E.	5. 8	5. 4	92
Surface	194	S.	S.	3. 3	3. 3	100

TABLE 22.—*Direction and velocity at upper levels with the different wind directions at the surface—year, combined data, 1929 and 1934*—Continued

SURFACE DIRECTION FROM SOUTHEAST

Altitude, (m.)	Number of observations	Mean direction from—	Resultant direction from—	Mean velocity (m.p.s.)	Resultant velocity (m.p.s.)	Stability (percent)
10,000	4	N. 59° E.	N. 62° E.	8. 5	5. 4	64
9,000	5	N. 8° E.	N. 5° W.	9. 0	6. 2	68
8,000	15	N. 11° E.	N. 17° W.	15. 4	2. 2	15
7,000	20	N. 12° E.	N.	14. 4	1. 8	12
6,000	28	N. 29° E.	N. 19° W.	12. 8	1. 3	10
5,000	41	N. 79° E.	S. 63° E.	10. 3	0. 5	5
4,000	52	S. 82° E.	S. 60° E.	8. 5	1. 5	18
3,000	64	S. 59° E.	S. 56° E.	7. 2	3. 4	47
2,500	78	S. 58° E.	S. 58° E.	6. 8	3. 4	50
2,000	87	S. 67° E.	S. 68° E.	7. 0	4. 1	59
1,500	96	S. 61° E.	S. 60° E.	7. 0	4. 6	65
1,000	106	S. 55° E.	S. 58° E.	6. 7	4. 4	65
750	107	S. 55° E.	S. 57° E.	7. 0	4. 8	69
500	110	S. 59° E.	S. 61° E.	7. 8	6. 0	77
250	114	S. 57° E.	S. 60° E.	7. 7	6. 7	87
Surface	118	S. 45° E.	S. 45° E.	4. 0	4. 0	100

TABLE 22.—*Direction and velocity at upper levels with the different wind directions at the surface—year, combined data, 1929 and 1934*—Con.

SURFACE DIRECTION FROM EAST

Altitude, (m.)	Number of observations	Mean direction from—	Resultant direction from—	Mean velocity (m.p.s.)	Resultant velocity (m.p.s.)	Stability (percent)
10,000	7	N. 21° E.	N. 30° W.	9. 7	1. 4	14
9,000	13	N. 22° E.	N. 8° W.	10. 0	2. 9	29
8,000	25	N. 55° E.	N. 41° W.	13. 1	1. 9	15
7,000	39	N. 33° E.	N. 37° W.	12. 9	1. 9	14
6,000	55	N. 1° E.	N. 36° W.	11. 8	2. 8	24
5,000	72	N. 10° E.	N. 5° W.	9. 7	2. 2	22
4,000	88	N. 12° E.	N. 19° E.	8. 3	2. 1	25
3,000	119	N. 53° E.	N. 40° E.	7. 3	2. 5	35
2,500	138	N. 60° E.	N. 56° E.	6. 8	3. 1	45
2,000	161	N. 73° E.	N. 73° E.	6. 7	3. 1	46
1,500	180	N. 69° E.	N. 69° E.	6. 7	3. 1	46
1,000	215	N. 68° E.	N. 66° E.	6. 6	2. 4	36
750	227	N. 67° E.	N. 63° E.	6. 7	3. 5	53
500	242	N. 71° E.	N. 70° E.	7. 0	4. 2	60
250	256	N. 87° E.	E.	7. 5	5. 9	79
Surface	256	E.	E.	5. 4	5. 4	100

SURFACE DIRECTION FROM NORTHEAST

5,000	4	E.	S. 89° E.	8. 8	7. 4	84
4,000	9	N. 86° E.	E.	8. 6	3. 3	38
3,000	23	N. 2° W.	N. 46° E.	8. 5	1. 3	15
2,500	29	N. 2° W.	N. 11° E.	7. 9	4. 2	63
2,000	32	N. 3° E.	N.	8. 0	4. 2	53
1,500	33	N. 5° E.	N. 2° W.	7. 2	3. 8	53
1,000	42	N. 4° E.	N. 2° W.	7. 1	4. 4	63
750	42	N. 10° E.	N. 1° W.	7. 3	5. 1	69
500	48	N. 12° E.	N. 12° E.	7. 1	5. 4	76
250	53	N. 25° E.	N. 27° E.	6. 9	5. 3	77
Surface	54	N. 45° E.	N. 45° E.	4. 5	4. 5	100

SURFACE DIRECTION FROM NORTH

3,000	6	S. 88° W.	N. 87° W.	9. 5	4. 7	49
2,500	6	S. 78° W.	S. 80° W.	9. 0	3. 5	39
2,000	12	N. 44° W.	N. 40° W.	9. 1	6. 8	75
1,500	18	N. 26° W.	N. 33° W.	8. 4	6. 6	79
1,000	21	N. 19° W.	N. 24° W.	9. 1	7. 9	86
750	26	N. 22° W.	N. 22° W.	8. 8	7. 6	86
500	28	N. 15° W.	N. 14° W.	8. 7	8. 2	94
250	29	N. 9° W.	N. 10° W.	8. 2	5. 9	72
Surface	29	N.	N.	5. 2	5. 2	100

SURFACE DIRECTION FROM NORTHWEST

5,000	3	S. 87° W.	S. 68° W.	17. 7	17. 7	100
4,000	3	S. 82° W.	S. 84° W.	8. 0	7. 9	99
3,000	5	S. 89° W.	S. 86° W.	9. 0	8. 1	90
2,500	5	S. 89° W.	S. 86° W.	9. 6	6. 9	72
2,000	6	S. 86° W.	S. 82° W.	9. 0	8. 6	96
1,500	8	S. 87° W.	N. 88° W.	9. 0	8. 2	91
1,000	9	S. 80° W.	W.	9. 9	9. 3	94
750	12	N. 78° W.	N. 75° W.	10. 5	9. 5	90
500	12	N. 81° W.	N. 81° W.	9. 6	8. 5	89
250	12	N. 82° W.	N. 77° W.	7. 2	6. 5	90
Surface	12	N. 45° W.	N. 45° W.	3. 0	3. 0	100

TABLE 22.—*Direction and velocity at upper levels with the different wind directions at the surface—year, combined data, 1929 and 1934*—Con.

SURFACE DIRECTION FROM WEST

Altitude, (m.)	Number of observations	Mean direction from—	Resultant direction from—	Mean velocity (m.p.s.)	Resultant velocity (m.p.s.)	Stability (percent)
9,000	4	S. 24° W.	S. 53° E.	11. 8	8. 4	72
8,000	6	S. 66° W.	S. 42° W.	13. 0	1. 4	11
7,000	9	N. 85° W.	W.	13. 0	2. 4	18
6,000	11	S. 88° W.	S. 83° W.	12. 5	8. 2	65
5,000	16	N. 77° W.	N. 74° W.	10. 9	5. 9	54
4,000	20	S. 85° W.	S. 80° W.	10. 2	6. 1	60
3,000	27	S. 79° W.	S. 78° W.	11. 0	7. 5	69
2,500	29	S. 78° W.	S. 77° W.	10. 4	7. 4	72
2,000	36	S. 66° W.	S. 65° W.	10. 9	8. 7	79
1,500	37	S. 60° W.	S. 62° W.	10. 3	8. 0	78
1,000	41	S. 65° W.	S. 63° W.	10. 8	8. 3	77
750	41	S. 59° W.	S. 56° W.	11. 0	8. 2	75
500	43	S. 54° W.	S. 63° W.	10. 2	7. 5	74
250	43	S. 66° W.	S. 64° W.	7. 8	6. 4	82
Surface	44	W.	W.	3. 2	3. 2	100

SURFACE DIRECTION FROM SOUTHWEST

11,000	4	N. 36° W.	N. 36° W.	11. 8	7. 8	66
10,000	9	N. 16° W.	N. 27° W.	9. 1	4. 8	53
9,000	20	N. 2° W.	N. 50° W.	11. 9	1. 4	12
8,000	29	N. 44° W.	N. 82° W.	11. 6	3. 1	27
7,000	44	N. 89° W.	S. 71° W.	10. 2	2. 4	23
6,000	64	S. 81° W.	S. 62° W.	9. 8	2. 3	24
5,000	84	S. 47° W.	S. 53° W.	9. 5	3. 2	33
4,000	121	S. 35° W.	S. 46° W.	8. 8	3. 4	39
3,000	156	S. 36° W.	S. 30° W.	8. 2	4. 6	56
2,500	178	S. 34° W.	S. 34° W.	8. 2	4. 5	54
2,000	196	S. 26° W.	S. 26° W.	7. 9	5. 1	65
1,500	210	S. 25° W.	S. 25° W.	8. 1	5. 5	68
1,000	217	S. 22° W.	S. 22° W.	8. 5	6. 1	72
750	218	S. 21° W.	S. 21° W.	8. 8	6. 3	71
500	225	S. 21° W.	S. 20° W.	9. 0	6. 6	73
250	237	S. 23° W.	S. 22° W.	7. 9	6. 2	79
Surface	234	S. 45° W.	S. 45° W.	7. 1	7. 1	100

SURFACE DIRECTION CALM

9,000	7	N. 73° E.	N. 50° E.	15. 0	1. 8	12
8,000	8	N. 45° W.	N. 82° W.	14. 4	6. 7	47
7,000	10	N. 39° W.	N. 69° W.	17. 9	7. 5	42
6,000	12	N. 68° W.	N. 79° W.	14. 3	4. 8	34
5,000	14	N. 32° W.	N. 64° W.	9. 9	2. 0	21
4,000	20	E.	S. 43° E.	7. 9	1. 2	15
3,000	26	S. 4° W.	S. 46° W.	6. 5	1. 2	18
2,500	26	S. 7° W.	S. 6° W.	5. 9	1. 9	32
2,000	29	S. 21° W.	S. 5° W.	5. 4	2. 4	44
1,500	34	S. 32° W.	S. 33° W.	5. 9	3. 5	59
1,000	35	S. 30° W.	S. 37° W.	6. 6	4. 2	63
750	36	S. 25° W.	S. 25° W.	6. 7	4. 0	60
500	36	S. 25° W.	S. 25° W.	6. 6	3. 7	56
250	36	S. 25° W.	S. 24° W.	4. 8	2. 9	61
Surface	36	Calm	Calm			

NOTE.—The computation has not been carried out for levels with less than 3 observations.

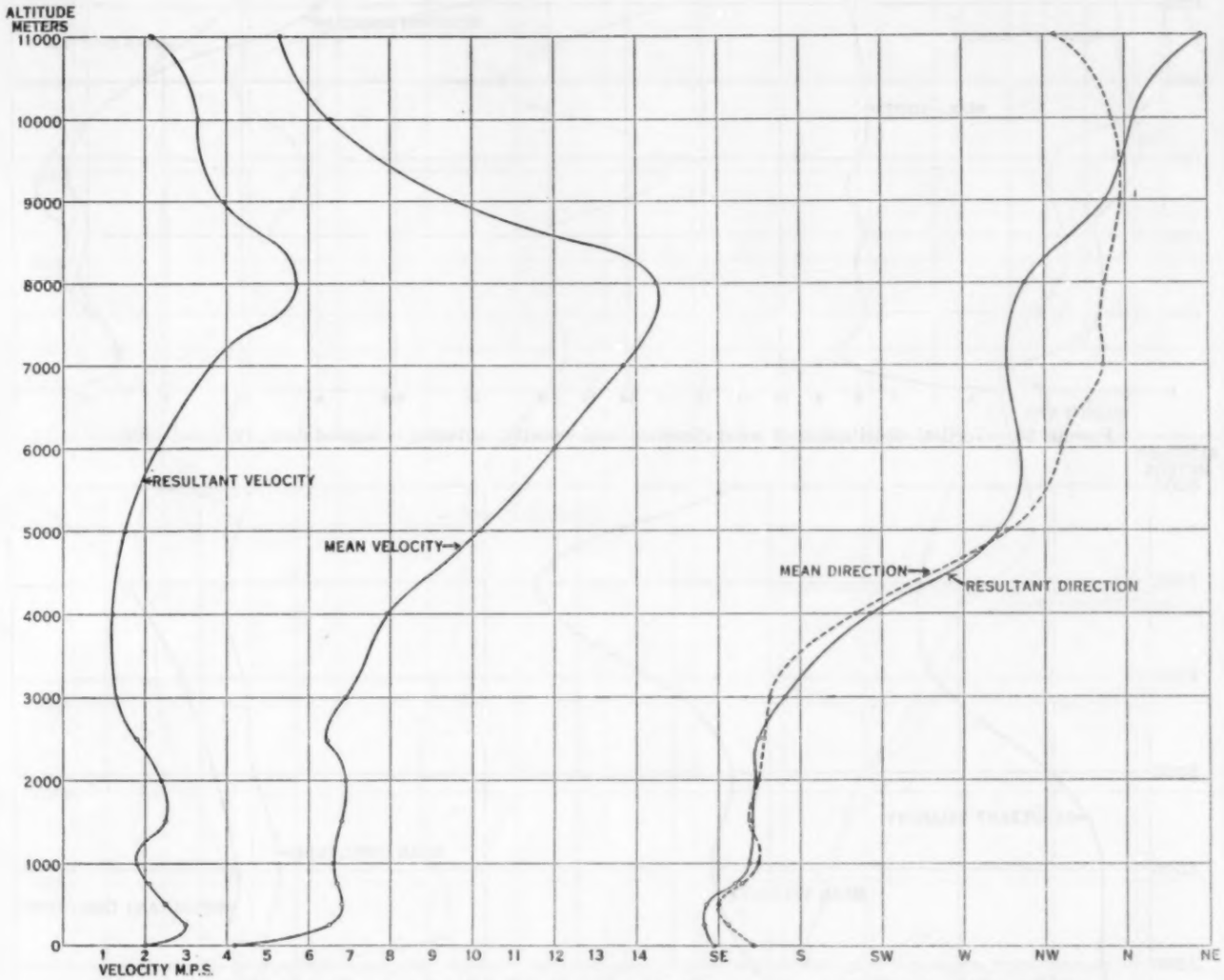

FIGURE 97.—Vertical distribution of wind direction and velocity summer, combined data; 1929 and 1934.

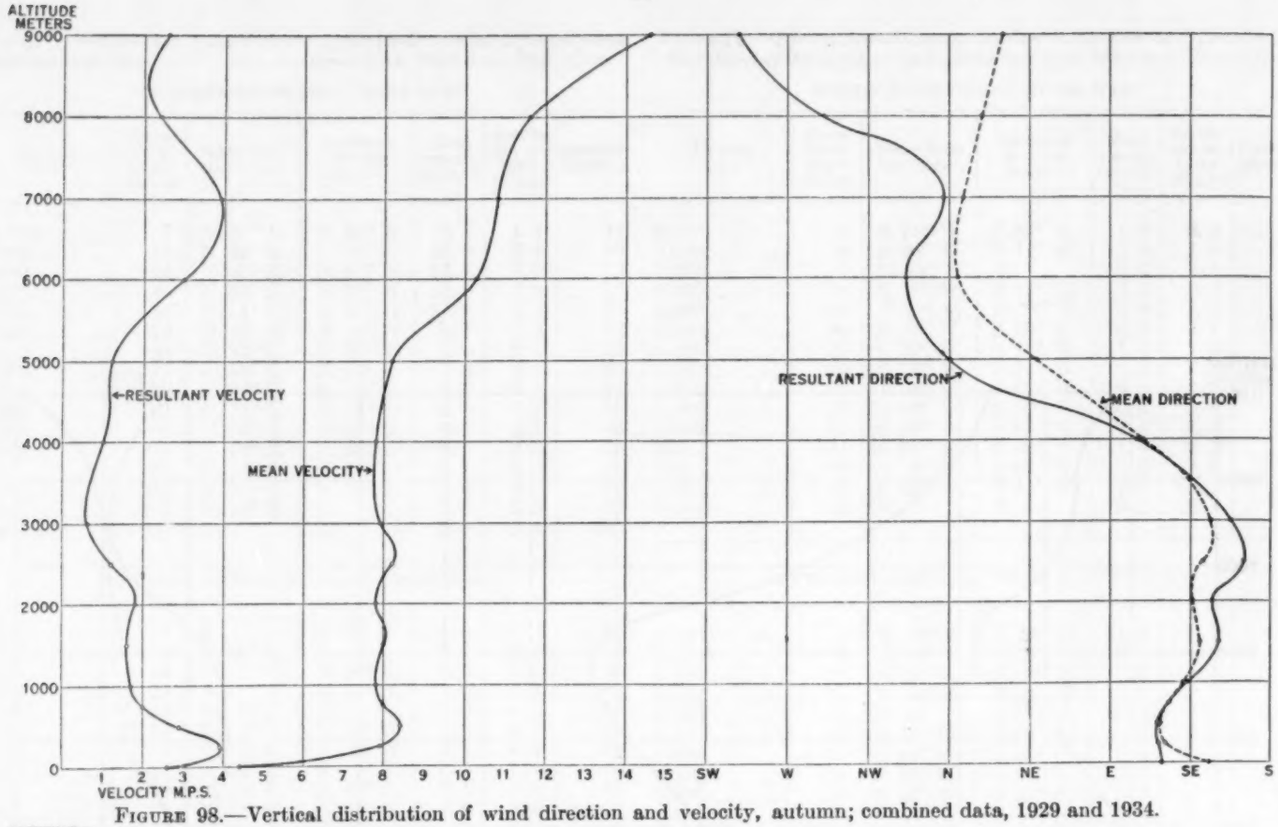

FIGURE 98.—Vertical distribution of wind direction and velocity, autumn; combined data, 1929 and 1934.

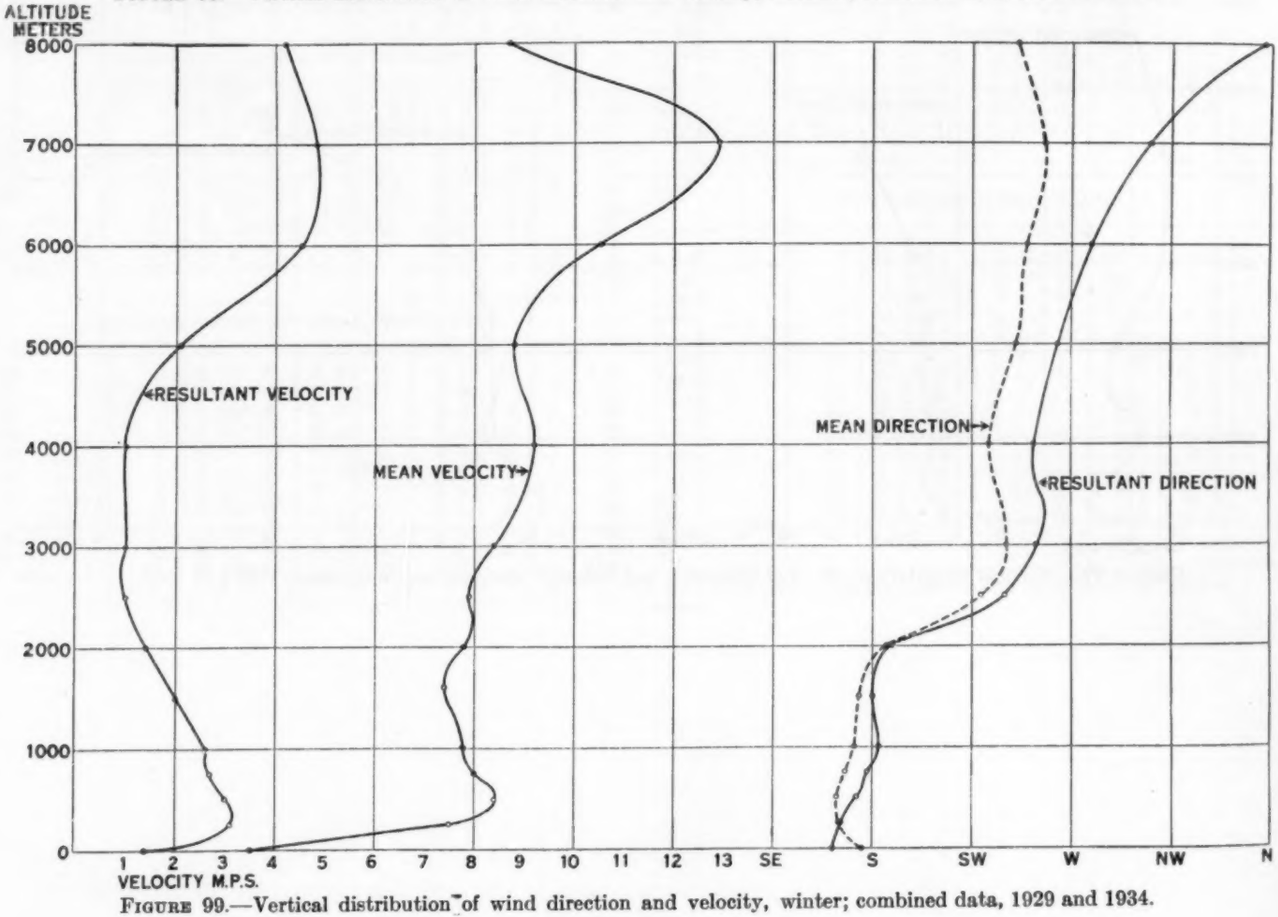

FIGURE 99.—Vertical distribution of wind direction and velocity, winter; combined data, 1929 and 1934.

FIGURE 100.—Vertical distribution of wind direction and velocity, 3 coldest months (July, August, September); combined data, 1929 and 1934.

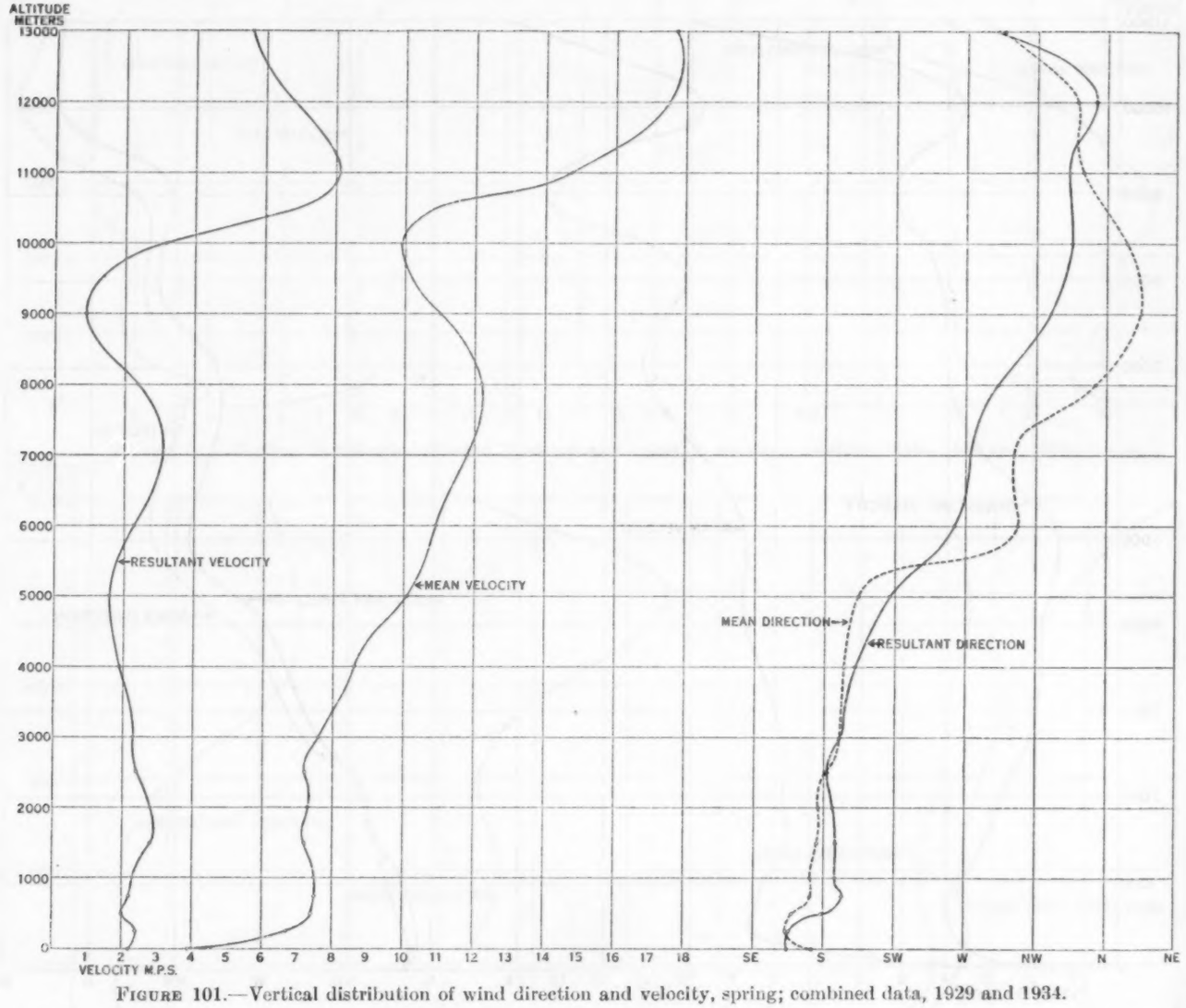

FIGURE 101.—Vertical distribution of wind direction and velocity, spring; combined data, 1929 and 1934.

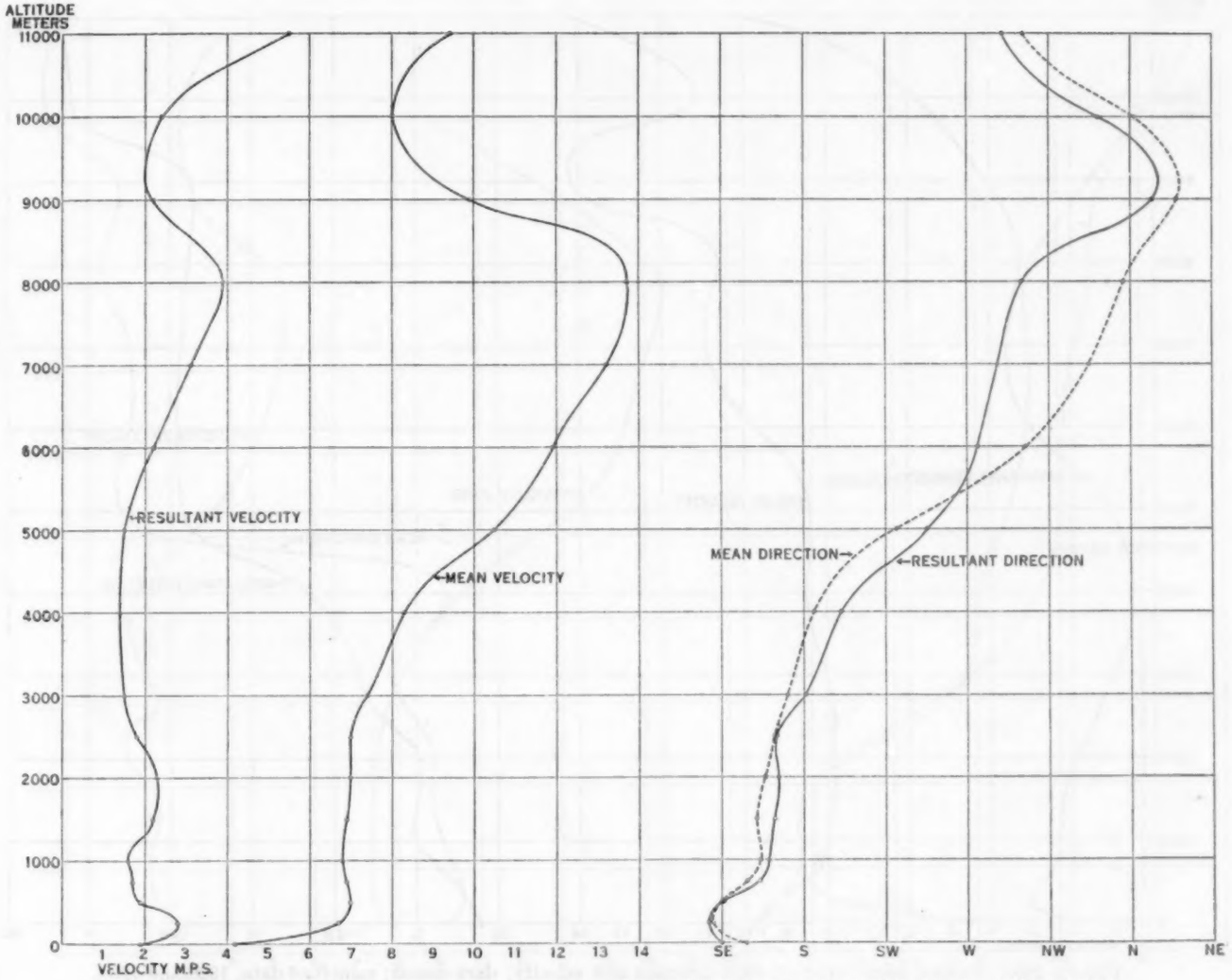

FIGURE 102.—Vertical distribution of wind direction and velocity, light season; combined data, 1929 and 1934.

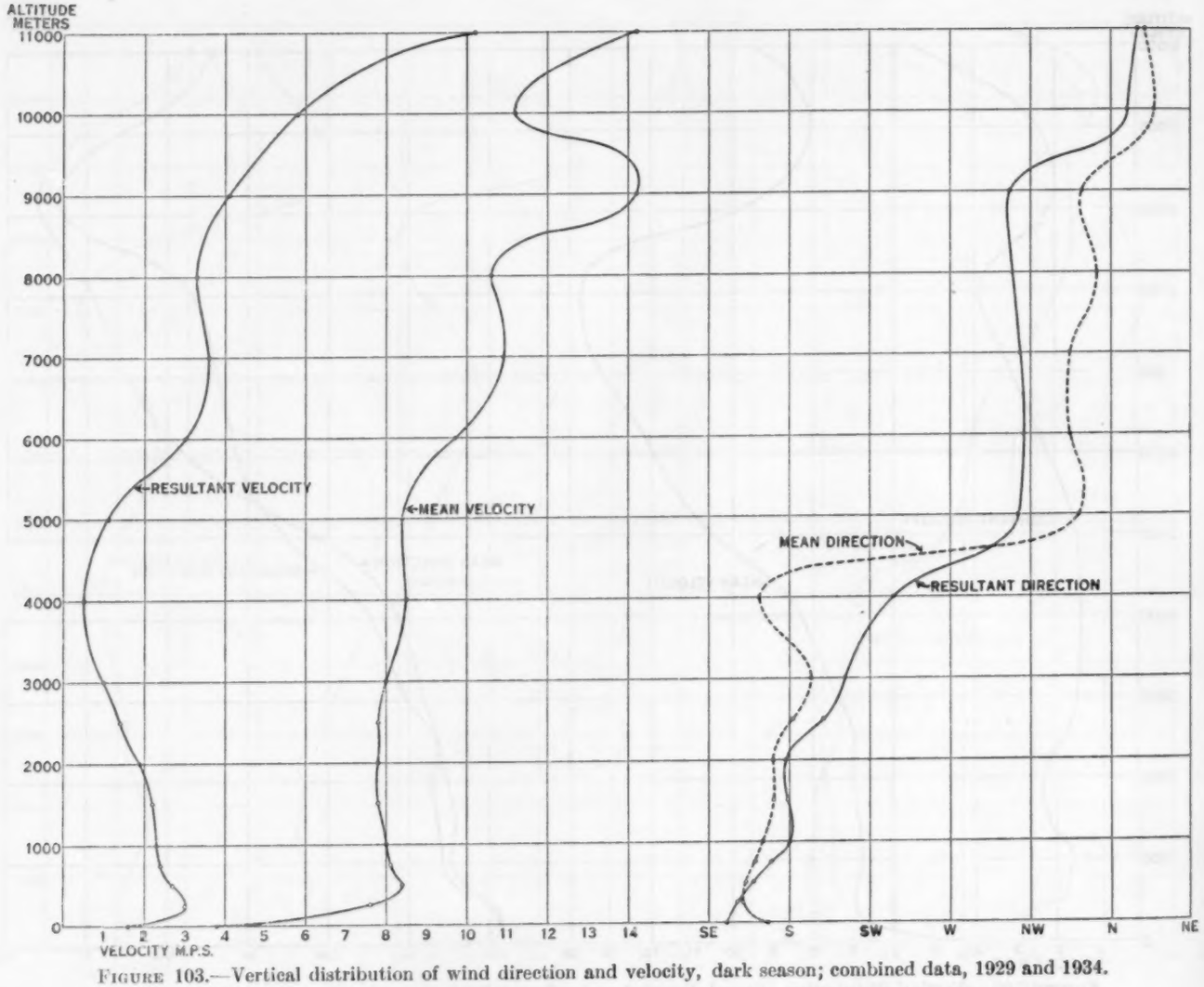

FIGURE 103.—Vertical distribution of wind direction and velocity, dark season; combined data, 1929 and 1934.

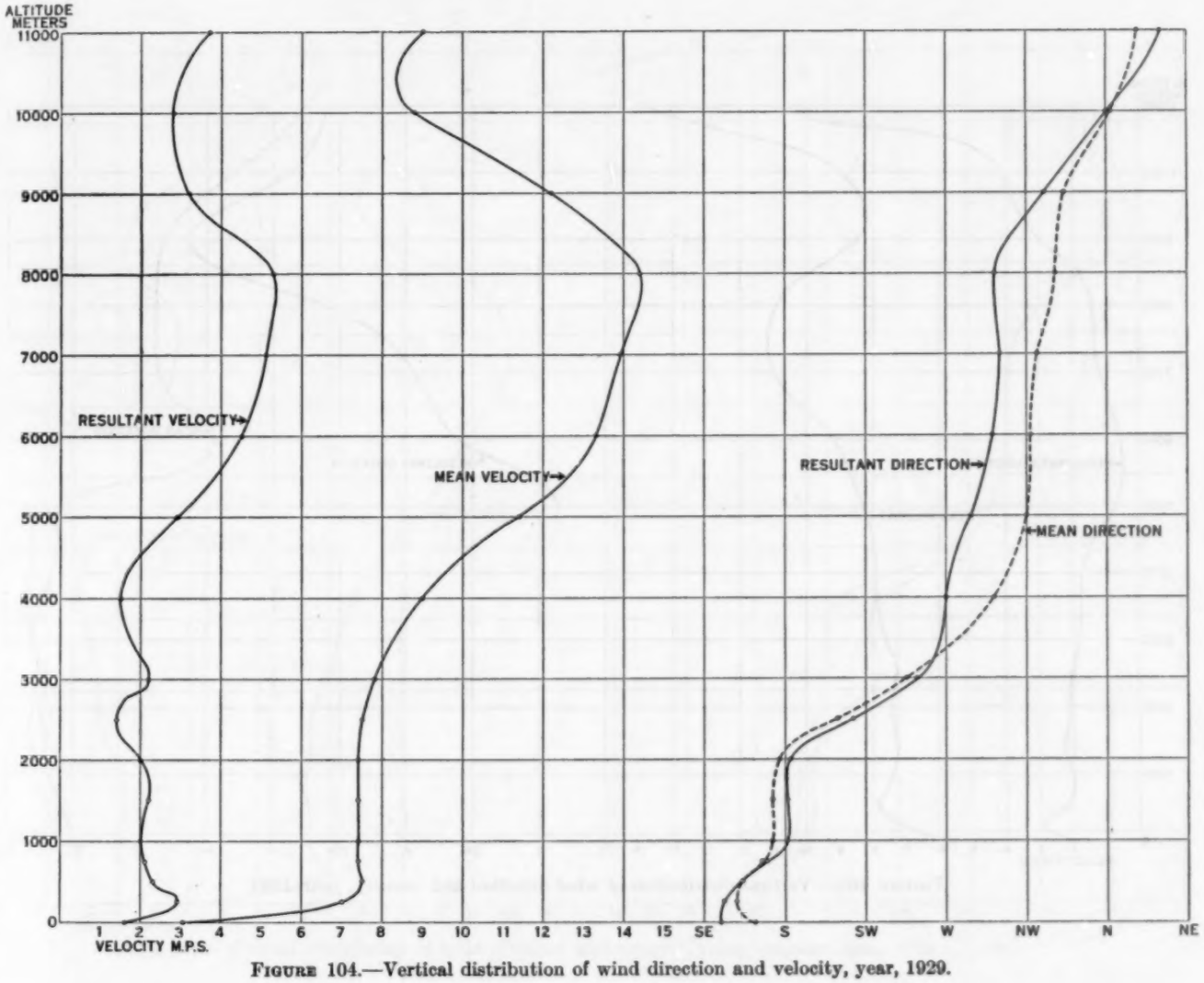

FIGURE 104.—Vertical distribution of wind direction and velocity, year, 1929.

237082—41——5

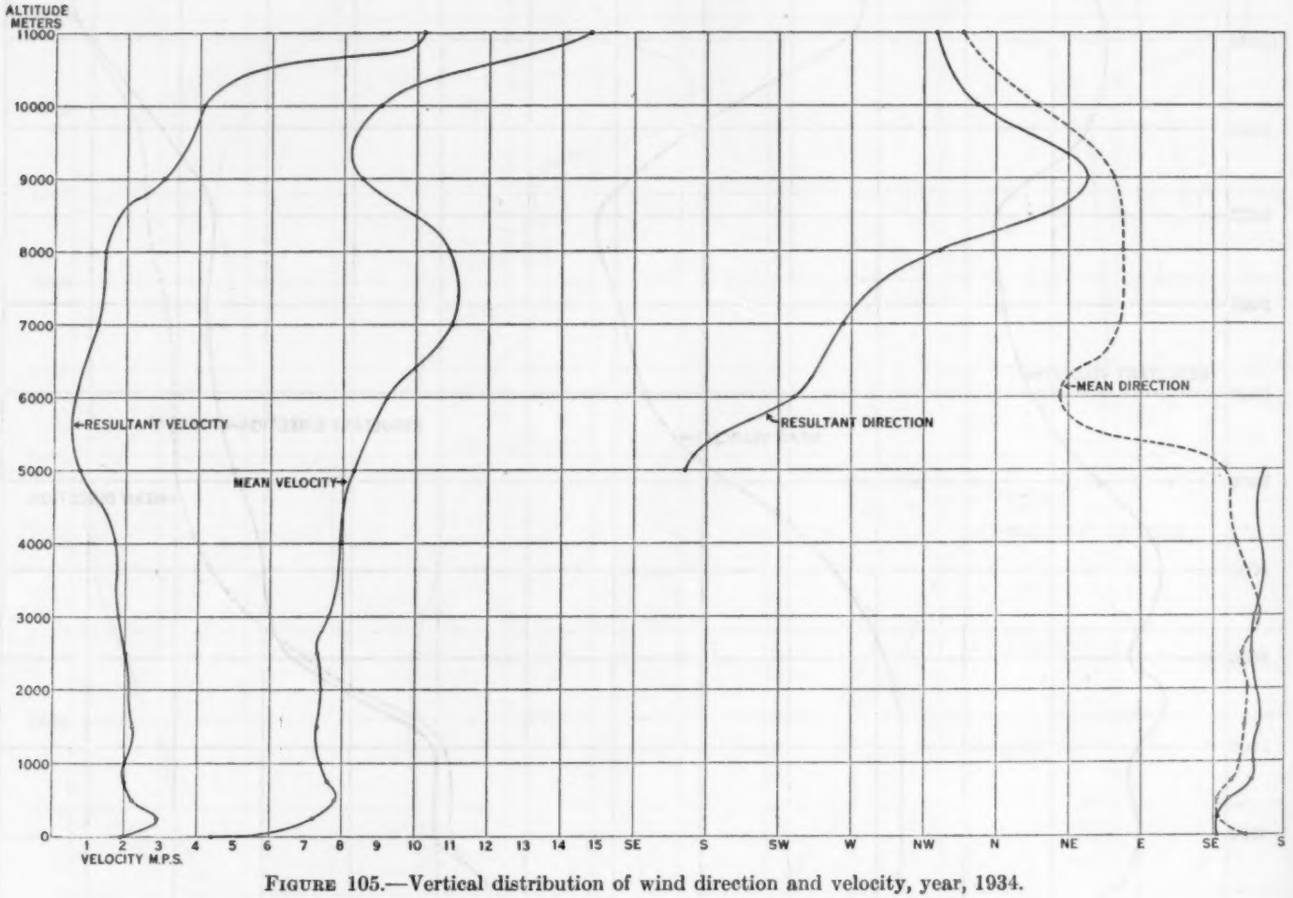

FIGURE 105.—Vertical distribution of wind direction and velocity, year, 1934.

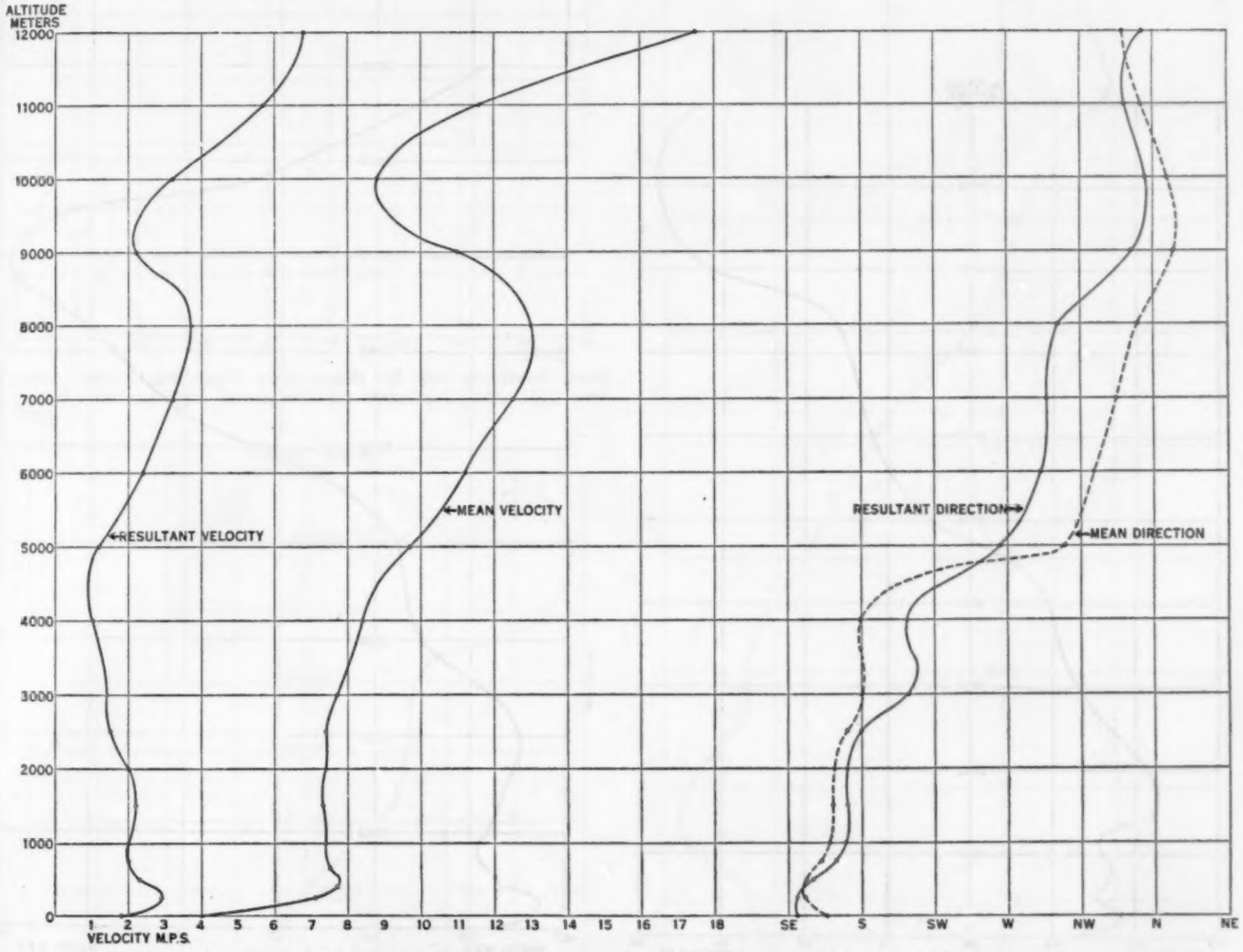

FIGURE 106.—Vertical distribution of wind direction and velocity, year; combined data, 1929 and 1934.

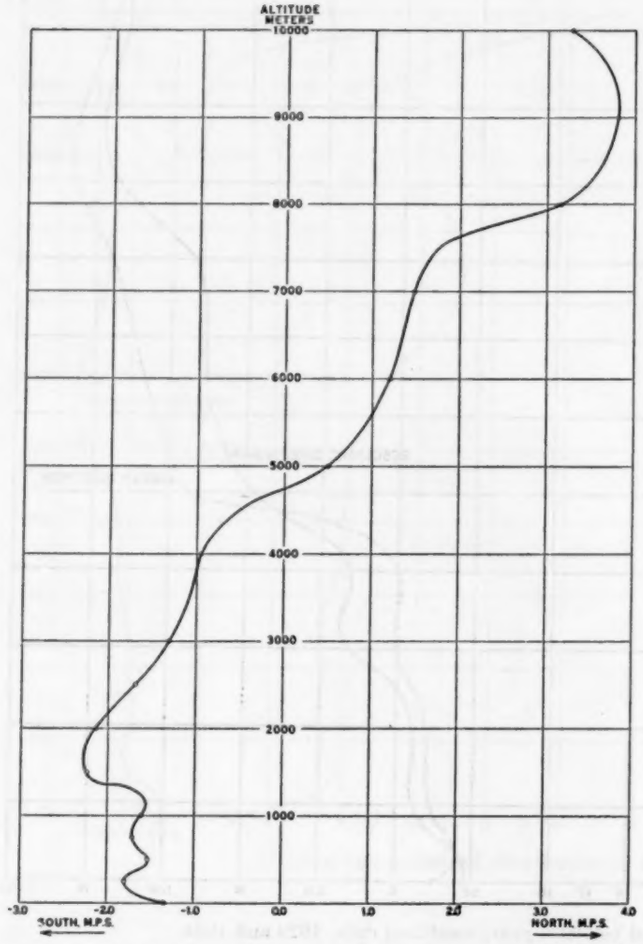

FIGURE 107.—North-south components of the resultant wind velocity at standard levels, summer; combined data, 1929 and 1934.

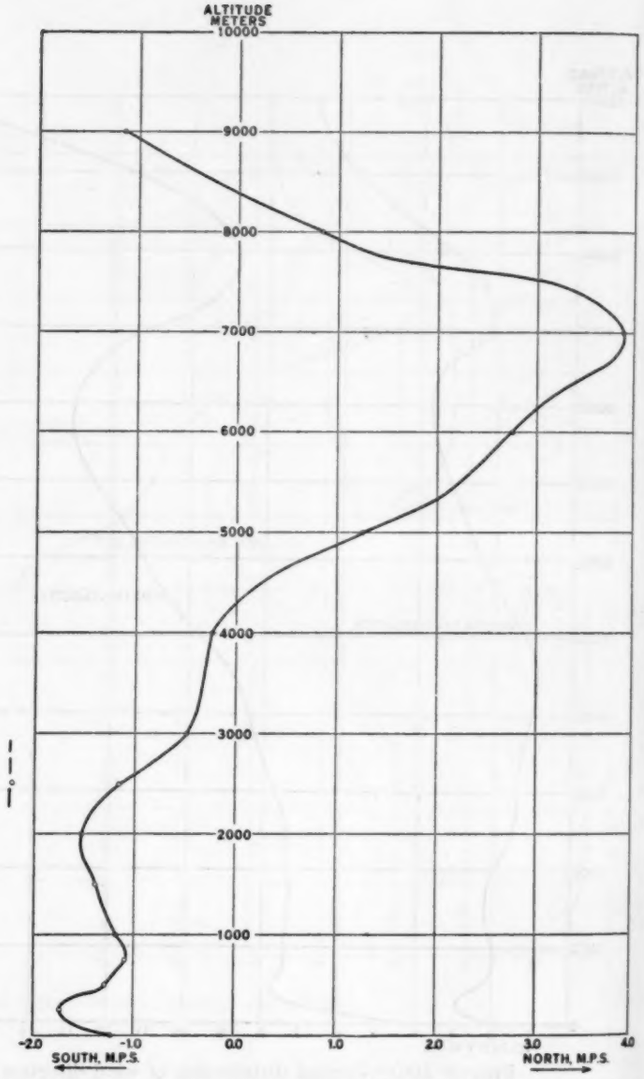

FIGURE 108.—North-south components of the resultant wind velocity at standard levels, autumn; combined data, 1929 and 1934.

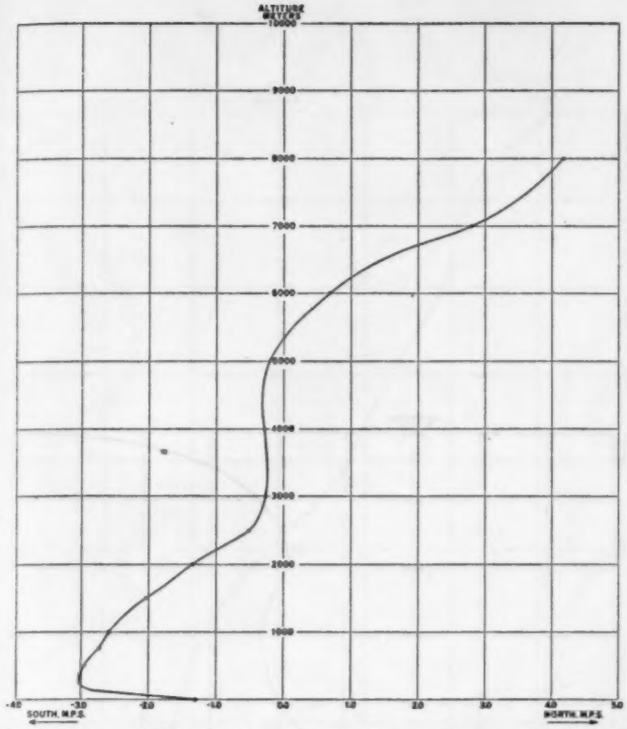

FIGURE 109.—North-south components of the resultant wind velocity at standard levels, winter; combined data, 1929 and 1934.

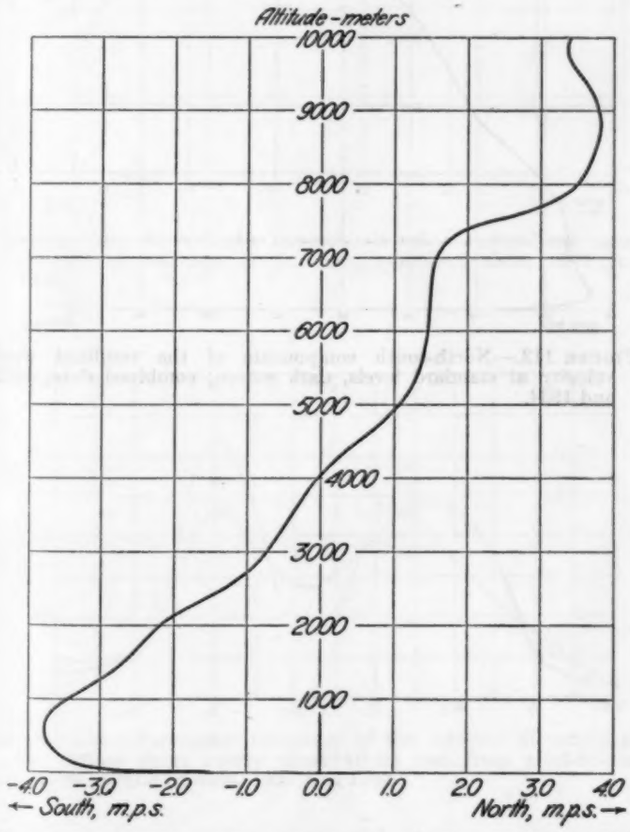

FIGURE 110.—North-south components of the resultant wind velocity at standard levels, 3 coldest months (July, August, September); combined data, 1929 and 1934.

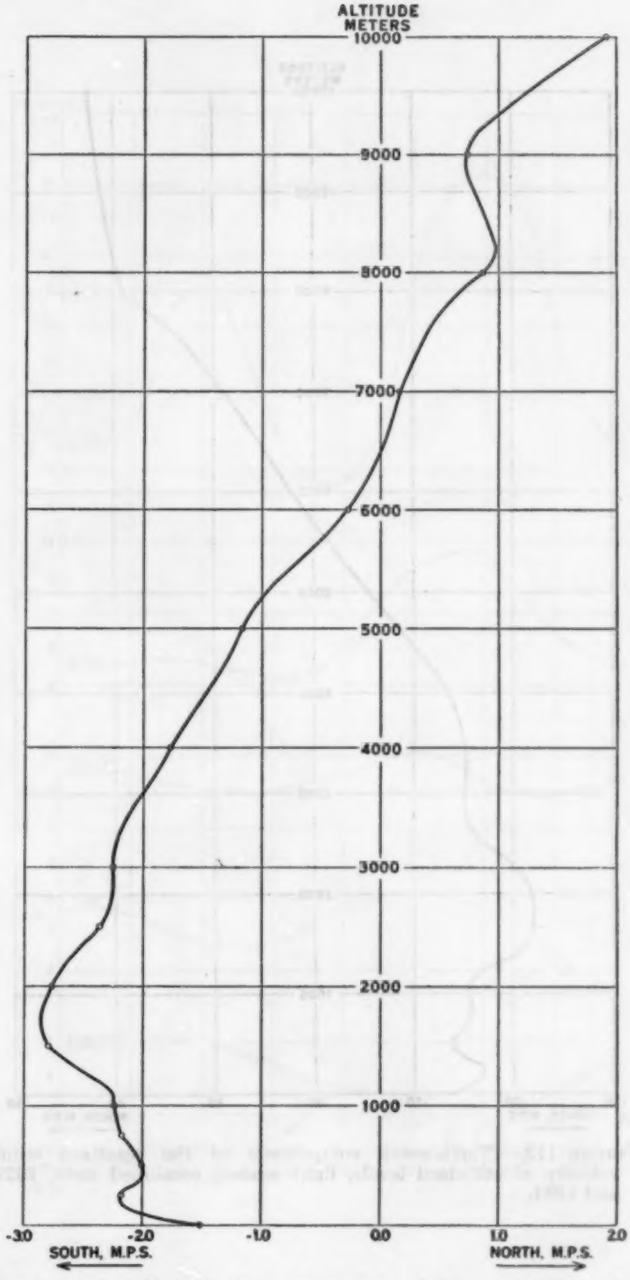

FIGURE 111.—North-south components of the resultant wind velocity at standard levels; combined data, 1929 and 1934.

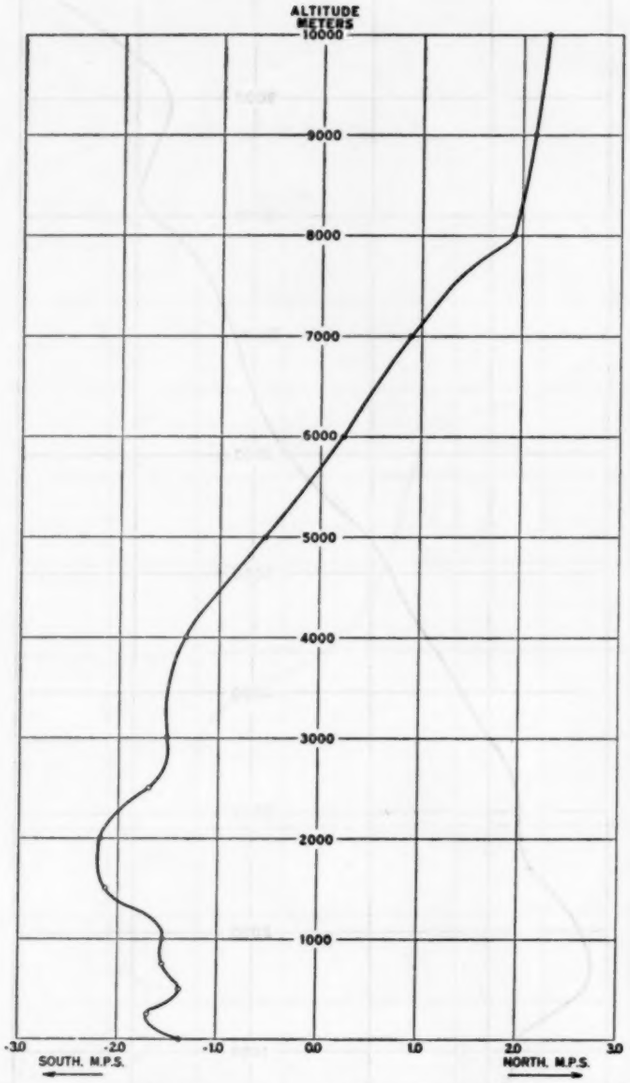

FIGURE 112.—North-south components of the resultant wind velocity at standard levels, light season; combined data, 1929 and 1934.

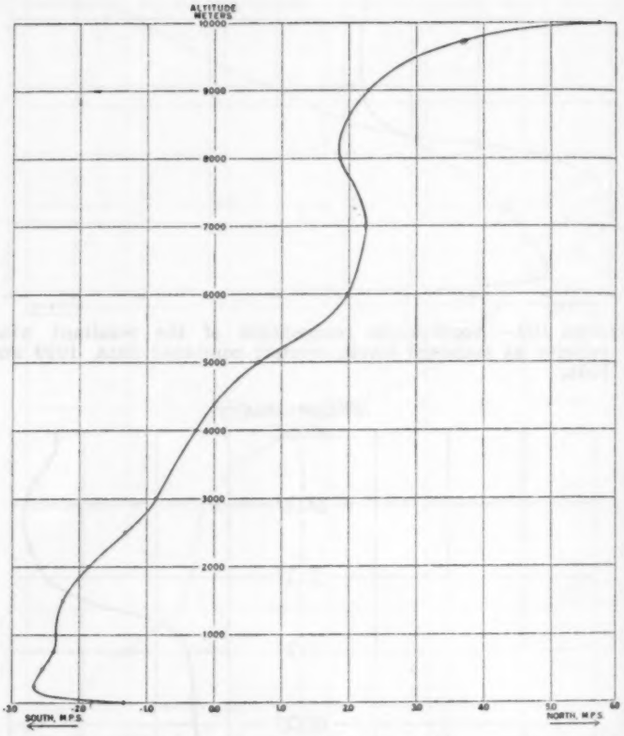

FIGURE 113.—North-south components of the resultant wind velocity at standard levels, dark season; combined data, 1929 and 1934.

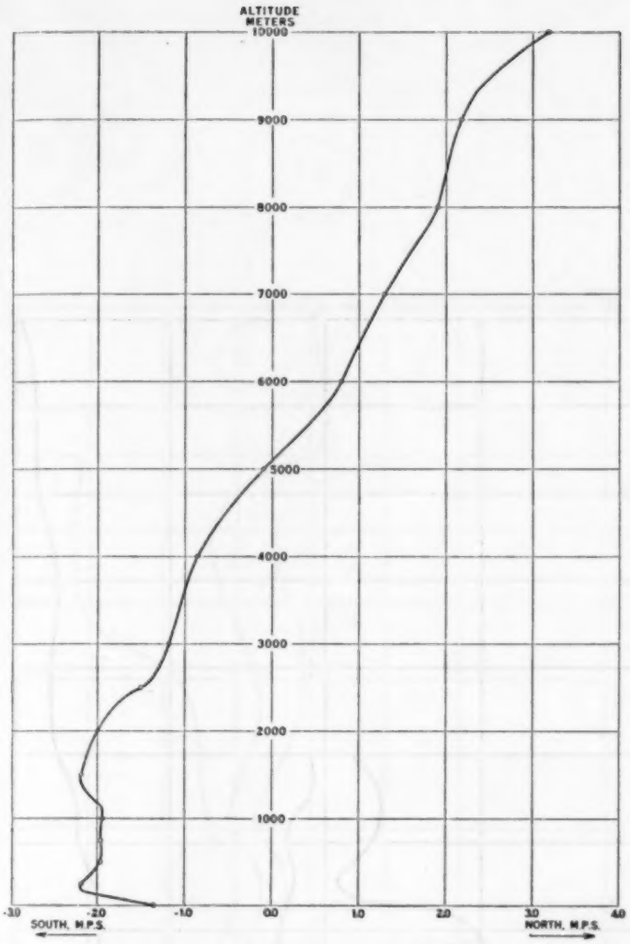

FIGURE 114.—North-south components of the resultant wind velocity at standard levels, year; combined data, 1929 and 1934.

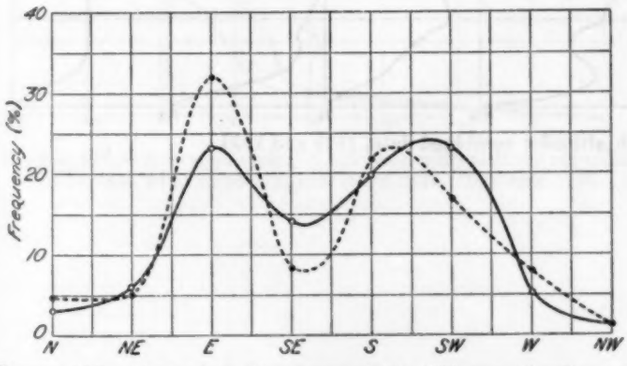

FIGURE 115.—Percentage frequency of the different directions at the surface from hourly observations and from pilot-baloon ascents, combined data, 1929 and 1934.

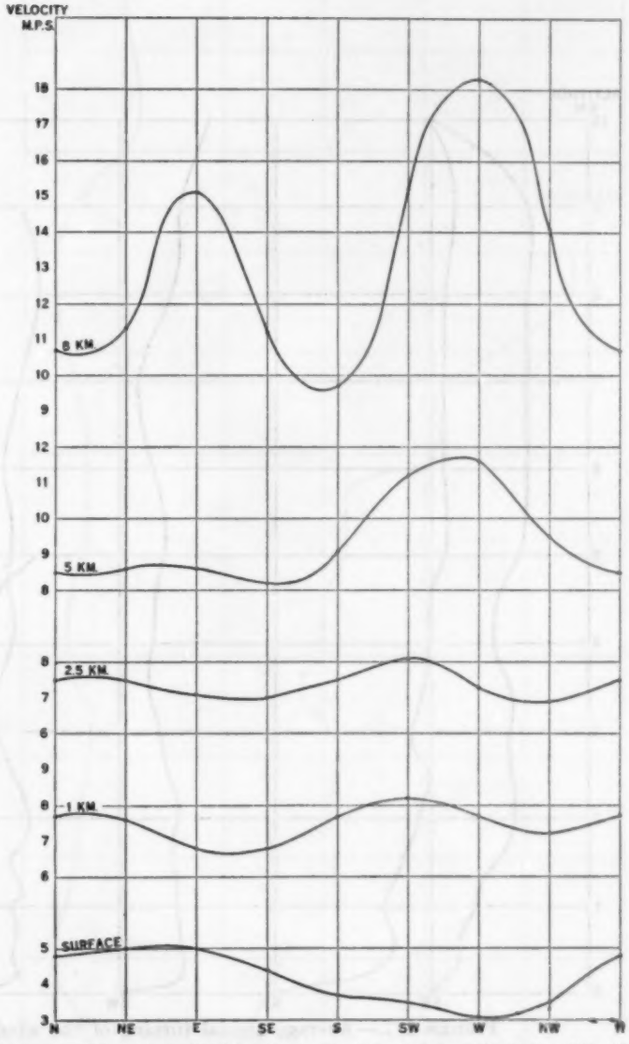

FIGURE 116.—Smoothed values of the mean velocity with the different directions at selected levels; combined data, 1929 and 1934.

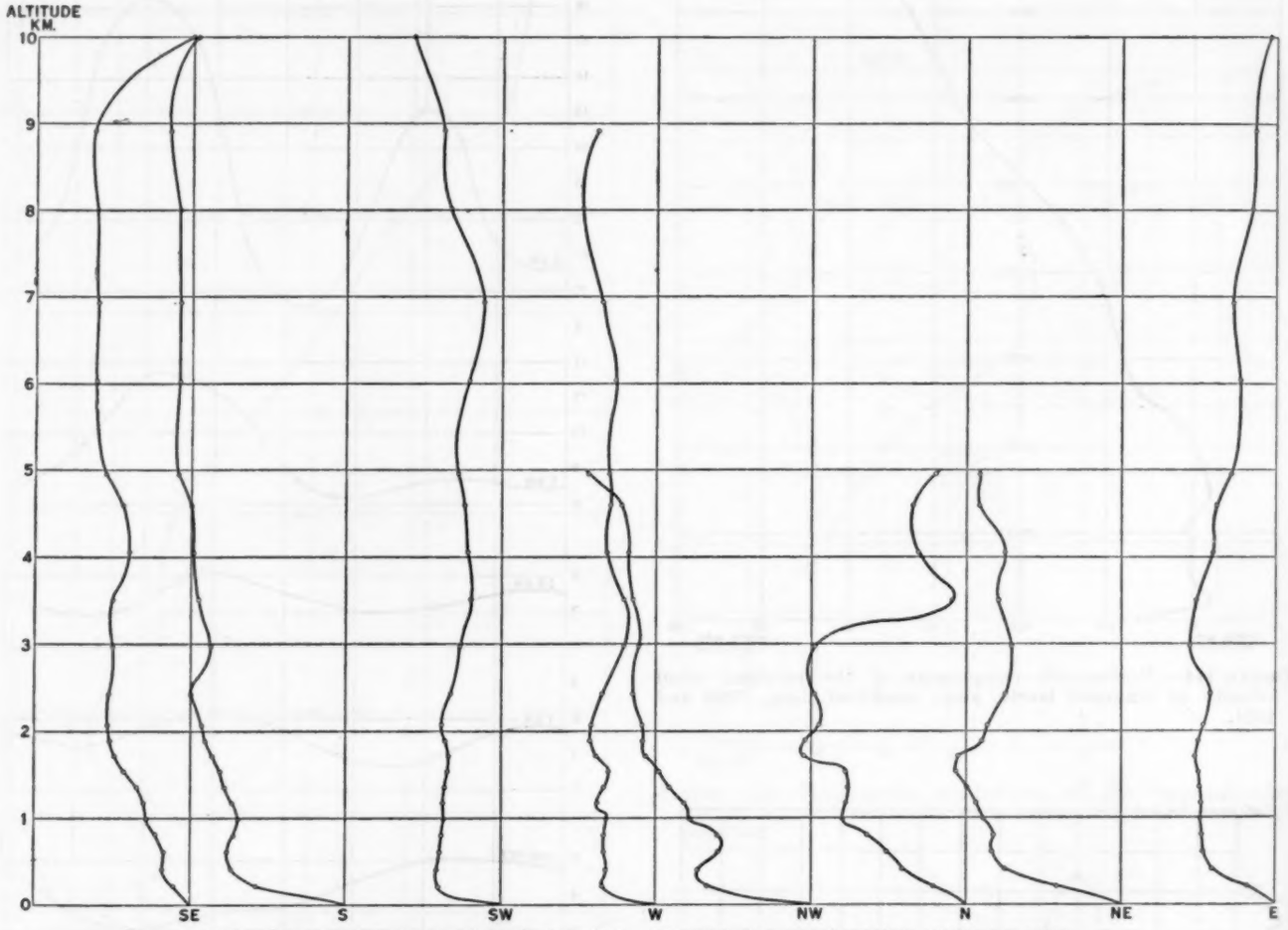

FIGURE 117.—Average annual turning of the wind with altitude; combined data, 1929 and 1934.

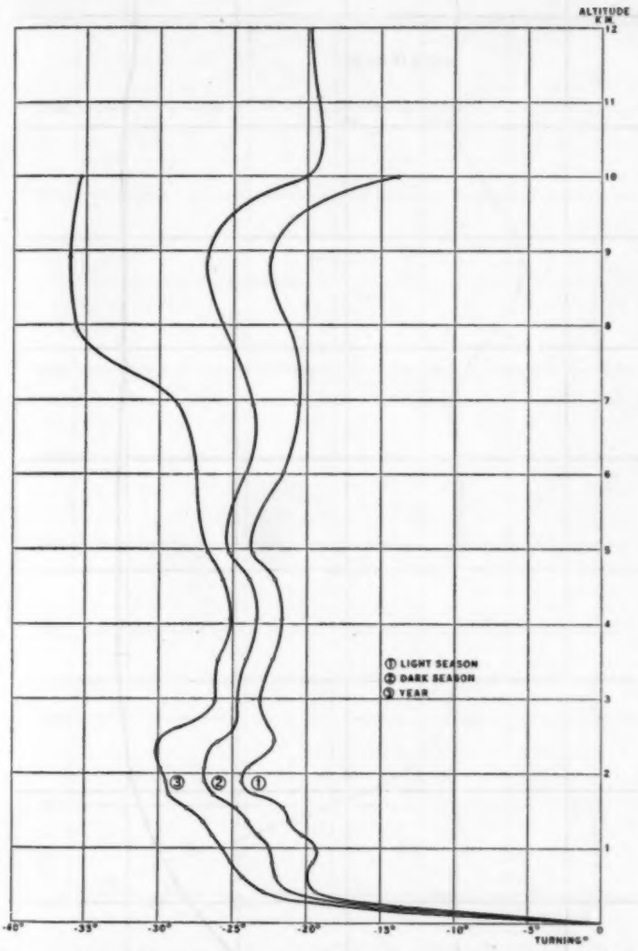

FIGURE 118.—Average turning of the wind with altitude regardless of surface wind direction; combined data, 1929 and 1934.

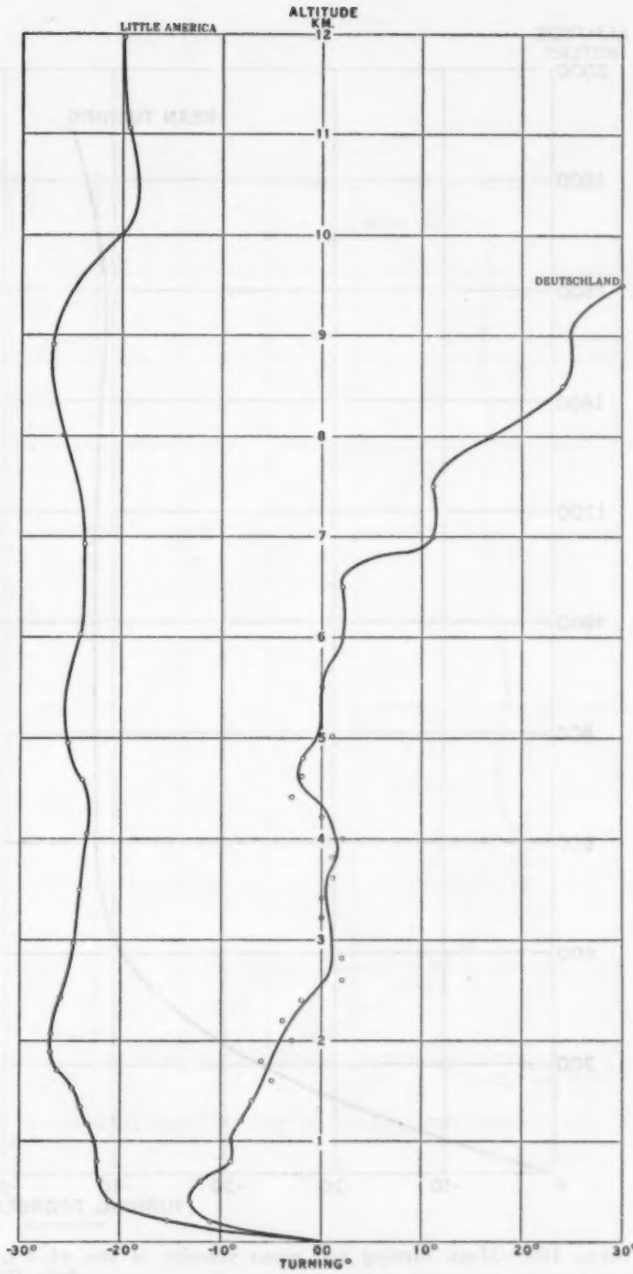

FIGURE 119.—Average annual turning of the wind with altitude at Little America and in the Weddel Sea region.

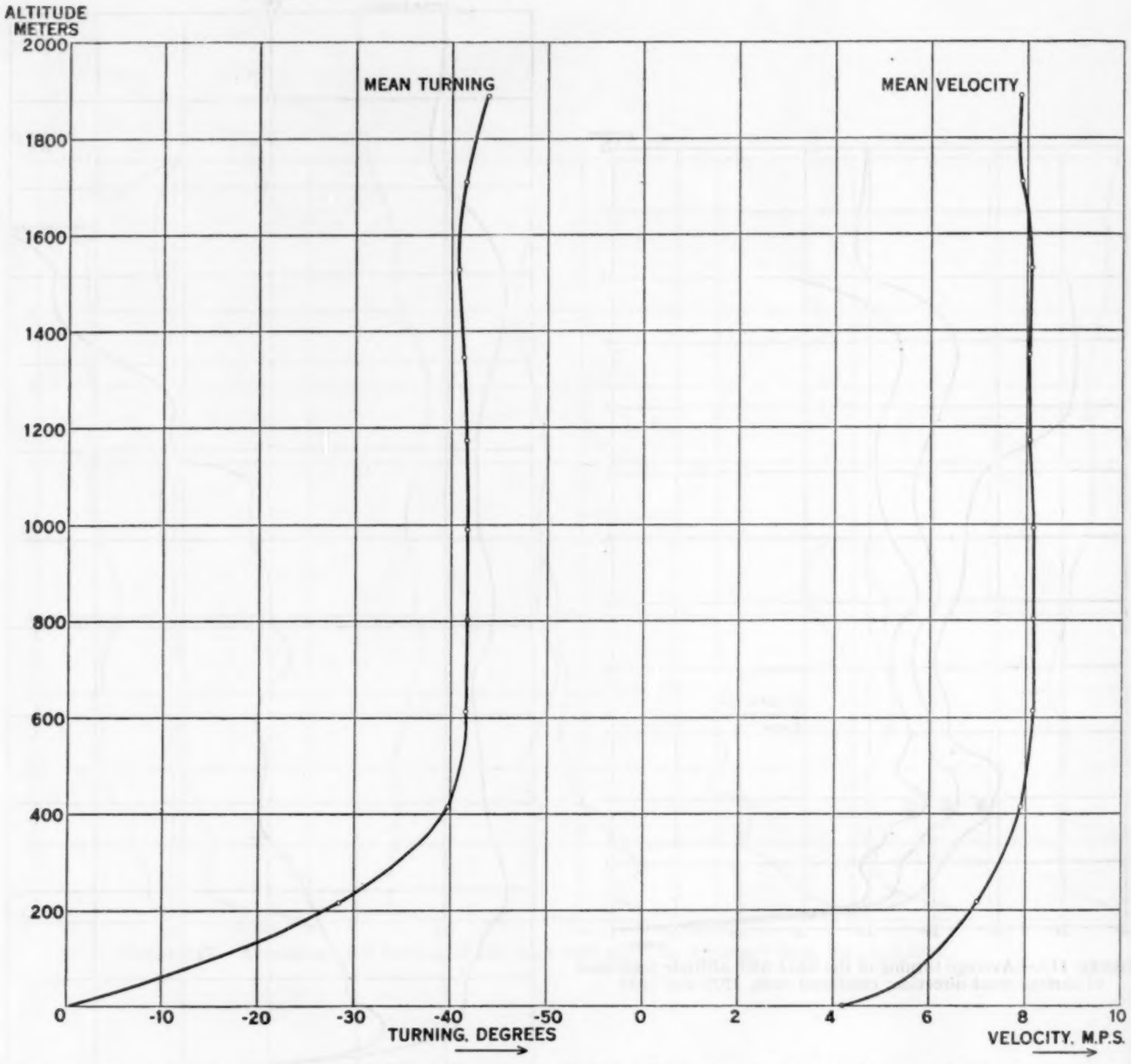

FIGURE 120.—Mean turning and mean velocity of the wind in the lowest layer based on selected ascents, light season; combined data, 1929 and 1934.

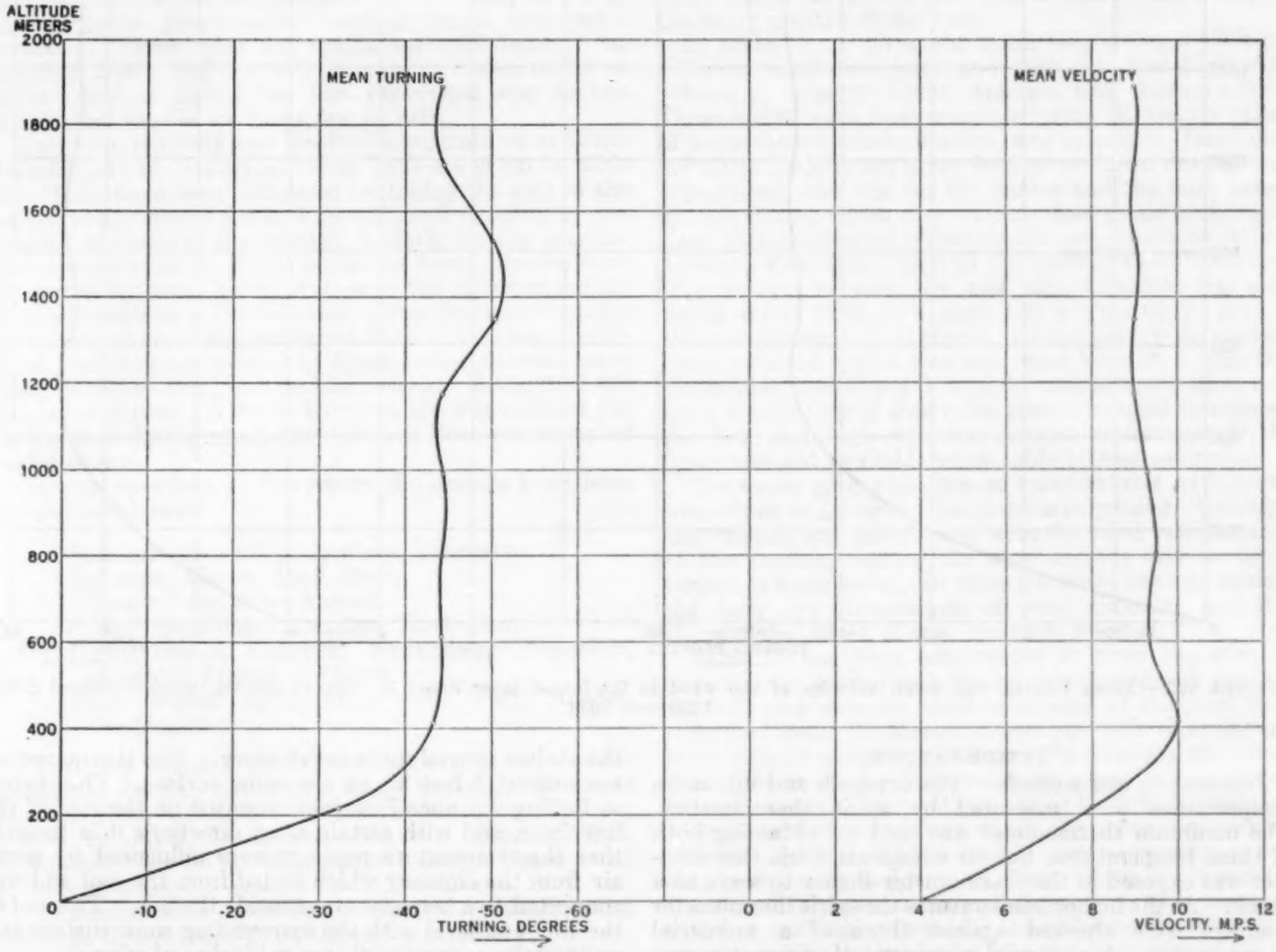

FIGURE 121.—Mean turning and mean velocity of the wind in the lowest layer based on selected ascents, dark season; combined data, 1929 and 1934.

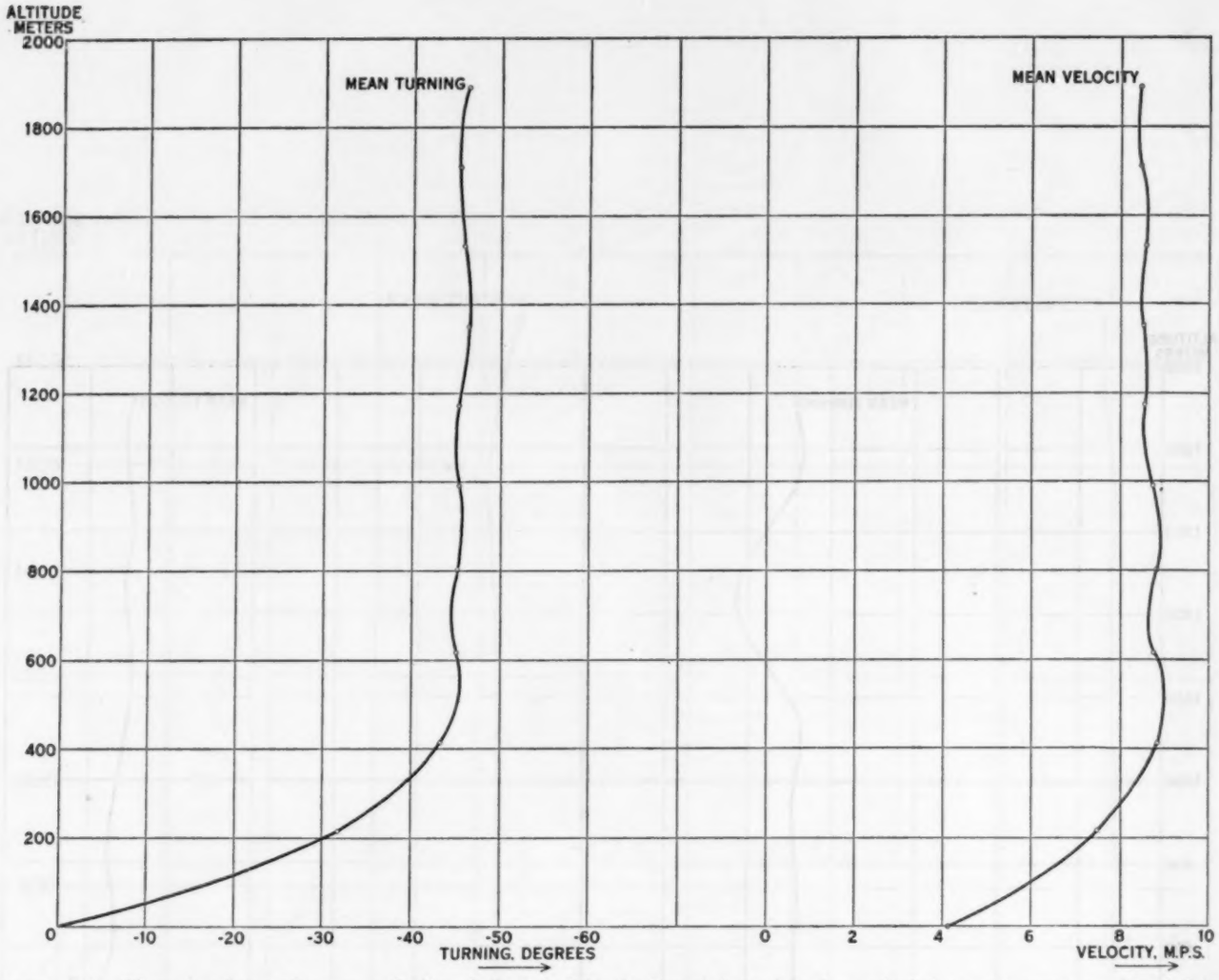

FIGURE 122.—Mean turning and mean velocity of the wind in the lowest layer based on selected ascents, year; combined data, 1929 and 1934.

3. TEMPERATURE

Instruments and methods.—The dry-bulb and minimum temperatures were measured by spirit thermometers. The minimum thermometer was used for obtaining both of these temperatures, but an additional spirit thermometer was exposed in the thermometer shelter to serve as a check. At the higher temperatures the spirit thermometer readings were checked against those of a mercurial thermometer. A mercurial maximum thermometer was also used when the temperature was −35° F. or above. Since the thermometers used had a zero correction over most of the temperature range, and corrections of only 0.1° or 0.2° at the very lowest temperatures, no corrections were applied to the readings.

The thermometer shelter was the same type used by the cooperative observers of the United States Weather Bureau (6), and it was set up to the southeast of one of the snow covered buildings of the first expedition and was secured in place by anchoring the supports to wooden posts driven into the snow. The shelters had approximately the same locations on both expeditions. Occasionally during severe blizzards, drifting snow would accumulate inside the shelter and put the thermograph out of action; but these cases were infrequent, and on the whole the shelter proved quite satisfactory. The thermometers were about 5 feet above the snow surface. The shelter at Bolling Advance Base was mounted on the roof of the hut there, and with certain wind directions it is possible that the temperature readings were influenced by warm air from the chimney which issued from the roof and was connected to a kerosene stove inside the hut. The roof of the hut was level with the surrounding snow surface and was usually covered with several inches of snow.

The thermographs used at Little America were of the standard type used by the United States Weather Bureau and manufactured by Friez, Baltimore. In order to prevent stopping of the clock at low temperatures all the oil was removed by immersion in ether and no oil was ever added afterward, the clockwork functioning perfectly even at the lowest temperatures. During most of the year it was necessary to mix alcohol with the thermograph ink in order to make it flow easily and to prevent freezing. In order to prevent condensation inside the clock, the thermograph drum was never taken indoors to change the record sheet; it was changed either at the shelter or in a nearby tunnel in the snow where the temperature was not much different from that outside. At Bolling Advance Base, a distant recording Foxboro (Mass.) thermograph

was used in which the temperature element, or bulb, was exposed in the instrument shelter and connected by tubing to the recording part inside the building. Although this type of temperature element is not very responsive to rapid fluctuations of temperature, the records seem quite satisfactory for the purpose for which they were intended.

At Little America the thermometers were read three times daily, at 8h, 14h, and 20h (180th meridian time), to the nearest tenth of a degree. At the Advance Base, thermometer readings were made twice daily, usually at 8h and 20h; and the readings were generally to the nearest degree, but sometimes to the nearest one-half degree. The corrections to the thermograph were determined from the thermometer readings at fixed hours, including the maximum thermometer readings when these were available. There was no maximum thermometer at Advance Base; and the only maximum thermometer at Little America during the first expedition was broken after it had been in use but a few months.

The mean monthly and seasonal temperatures at Little America and at Bolling Advance Base are given in table 23. They have been computed by taking the sum of the hourly temperatures for each month, and dividing by the number of hours in the month; similarly for the seasons. The mean values in the other tables have likewise been computed by using hourly values of the different meteorological elements. There are also given the mean monthly temperatures from the combined data of the two expeditions, and they are plotted in figure 123, a smooth curve being drawn to bring out the characteristic features of the annual variation. A curve based on the 6 months of the dark season during which the Advance Base was occupied is also shown.

Here as elsewhere in this report the seasons have been defined as follows:

Summer: December, January, February.
Autumn: March, April, May.
Winter: June, July, August.
Spring: September, October, November.
Light Season: October, November, December, January, February, March.
Dark Season: April, May, June, July, August, September.

Thus, the summer season for 1929 is based on the months of January, February, and December 1929, and January 1930, while that for 1934 is based on February (about 19 days), December 1934, and January 1935. The summer season for the combined data is based on all of these months; likewise for the light season.

The results obtained at Framheim during 1911 are also shown in figure 123. The positions are as follows:

Framheim: Latitude 78°38′ S; longitude 163°37′ W.

Little America: Latitude 78°34′06″ S; longitude 163° 55′58″ W.

Bolling Advance Base: Latitude 80°08′ S; longitude 163°55′ W.

It is evident that Framheim was not more than several miles distant from the subsequent location of Little America, and it is thus permissible to compare the results at the two stations.

In table 24 are given the mean monthly temperature, wind velocity, and cloudiness for corresponding selected months, but for the two different years at Little America. The months chosen were those showing the greatest difference in temperature; and it is clear at a glance that when a corresponding month has a higher temperature, it is very definitely associated with higher wind velocities and greater cloudiness.

In table 25 is given the difference between the mean monthly and seasonal temperatures at Little America and Advance Base for the 6 months during which the latter station was occupied, the minus sign indicating that the Advance Base temperature was lower than that at Little America. For the period in question, the mean temperature was always considerably less at Advance Base; and there can be no doubt that this is also characteristic of the other months of the year.

In table 26 are given the mean temperatures with the different wind directions, and with low and high wind velocities, both at Little America and Advance Base. These means have been computed from the hourly values of temperature, wind direction, and velocity. The values for Little America are given for the combined data of both expeditions, and also for the winter and the dark season of 1934 during which observations were made at Advance Base (Meteorological observations were made at Bolling Advance Base from April to September, 1934, inclusive). The division between low and high velocities was arbitrarily set at 12 m. p. h. since this is close to the average annual velocity, but, of course, not necessarily the median. From table 42, which was computed later, it is seen that the median is at about 8 m. p. h., and it would have been more satisfactory if this value had been used to separate the low and high velocity groups; unfortunately, this figure was not available when table 26 was computed.

The result giving the lowest temperatures with northwest winds at Advance Base is quite surprising. Considerable trouble was experienced with the wind vane contacts at this station, making the wind records difficult to interpret in some cases. In these instances use was made of the daily eye observations of wind direction, and it is thought that little, if any, error has resulted.

Table 29 has been constructed to show the effect of cloudiness and wind velocity on temperature; it contains the following data for the four seasons of the year, using combined data: (1) Mean temperature with clear sky and low wind; (2) mean temperature with clear sky and strong wind; (3) mean temperature with clear sky computed from all observations in (1) and (2); (4) mean temperature with cloudy sky and low wind; (5) mean temperature with cloudy sky and high wind; (6) mean temperature with cloudy sky computed from all observations in (4) and (5); (7) the difference in mean temperature with clear sky with low and high winds; (8) the difference in mean temperature with cloudy sky for low and high winds; (9) the difference in mean temperature with clear and cloudy sky. The table also contains: (10) the mean temperature for the season (and year); (11) the difference between the mean seasonal temperature (and yearly mean) and the mean temperature (1), (2), (4) and (5). The mean values (1), (2), (3), (4), (5), and (6) have all been computed from hourly values of wind velocity, temperature and cloudiness. Since hourly observations of cloudiness were not made at Advance Base, no table has been constructed for that station.

TABLE 23.—*Mean monthly and seasonal temperatures at Little America and Bolling Advance Base, °F.*

LITTLE AMERICA

January 1929	[1] 21.1	July	−45.8	February 1934	[6] −0.4	October 1934	−14.3
February 1929	[2] 18.6	August 1929	−28.0	March 1934	−14.0	November 1934	−2.0
February 1929	[3] 2.5	September 1929	−44.2	April 1934	−15.7	December 1934	17.2
February 1929	[4] 11.0	October 1929	−17.7	May 1934	−19.4	January 1935	24.1
March 1929	−5.0	November 1929	1.7	June 1934	−13.7	Year 1934	−12.7
April 1929	−29.7	December 1929	19.3	July 1934	−37.1		
May 1929	−22.7	January 1930	19.3	August 1934	−38.6		
June 1929	−10.6	Year 1929	[5] −12.8	September 1934	−34.2		

LITTLE AMERICA, COMBINED DATA

January 1929, 1930, 1935	21.5	April 1929, 1934	−22.7	August 1929, 1934	−33.3	December 1929, 1934	18.2
February 1929, 1934	6.4	May 1929, 1934	−21.1	September 1929, 1934	−39.2	Year 1929, 1934	−12.8
March 1929, 1934	−9.5	June 1929, 1934	−12.1	October 1929, 1934	−16.0		
		July 1929, 1934	−41.5	November 1929, 1934	−0.1		

BOLLING ADVANCE BASE

April 1934	−31.9	June 1934	−25.0	August 1934	−46.8	Mean, April–September	−38.1
May 1934	−30.4	July 1934	−51.7	September 1934	−44.8		

LITTLE AMERICA

	Summer	Fall	Winter	3 coldest months	Spring	Light season	Dark season	Year
1929	17.1	−19.0	−28.3	−39.3	−20.1	4.8	−30.2	−12.8
1934	15.7	−16.4	−30.0	−36.6	−16.8	1.9	−26.6	−12.7
Combined data 1929 and 1934	16.4	−17.7	−29.2	−38.0	−18.4	2.8	−28.4	−12.8

BOLLING ADVANCE BASE

	Winter	3 coldest months	Dark season
1934	−41.3	−47.8	−38.1

[1] On board ship in Bay of Whales.
[2] First 15 days of February on board ship in Bay of Whales.
[3] Last 13 days of February at Little America.
[4] From combined observations for February on board ship in Bay of Whales and at Little America.
[5] Includes observations on board ship in the Bay of Whales.
[6] For the last 19 days in February.

TABLE 24.—*Mean monthly temperature, wind velocity, and cloudiness for selected months at Little America*

Month	April		July		August		September		January	
	1929	1934	1929	1934	1929	1934	1929	1934	1930	1935
Mean wind velocity (m. p. h.)	8.4	14.3	7.9	11.0	8.9	8.8	8.2	11.5	9.7	11.8
Mean cloudiness (0–10)	5.7	7.7	3.5	4.2	5.7	4.7	4.4	5.7	7.1	7.7
Mean temperature, ° F	−29.7	−15.7	−45.8	−37.1	−28.0	−38.6	−44.2	−34.2	19.3	24.1

TABLE 25.—*Difference in mean monthly and seasonal temperatures at Little America and at Advance Base*

Month	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	Winter 1934	Dark season 1934	3 coldest months 1934
Temperature difference, ° F	−16.2	−11.0	−11.3	−14.6	−8.2	−10.6	−11.3	−11.5	−11.2

TABLE 26.—*Mean temperature with the different wind directions and with low and high wind velocities at Little America and at Bolling Advance Base, °F.*

LITTLE AMERICA, COMBINED DATA, 1929 AND 1934

	North			Northeast			East			Southeast		
	V<12 m. p. h.	V≥12 m. p. h.	All velocities	V<12 m. p. h.	V≥12 m. p. h.	All velocities	V<12 m. p. h.	V≥12 m. p. h.	All velocities	V<12 m. p. h.	V≥12 m. p. h.	All velocities
Summer	26.7	29.0	27.6	24.5	28.4	26.2	16.0	19.1	17.8	15.6	14.2	14.8
Fall	−17.1	6.8	−2.1	−14.8	10.9	1.8	−18.1	−7.9	−10.6	−23.3	−4.0	−13.7
Winter	−21.6	−13.0	−17.2	−21.4	−1.1	−10.8	−22.4	−8.4	−14.6	−31.9	−5.5	−16.4
Spring	−3.4	6.2	1.3	−11.1	−6.1	−9.1	−14.6	−8.5	−10.9	−17.6	−3.4	−11.8
Light season	−17.4	20.6	18.9	15.5	20.2	17.8	4.2	5.9	5.2	4.1	9.7	7.0
Dark season	−21.3	−6.1	−13.1	−23.1	.8	−10.1	−24.6	−12.0	−16.6	−30.7	−6.6	−17.9
Year	5.8	10.5	8.1	−1.2	10.5	4.8	−8.7	−2.3	−4.7	−12.6	1.5	−5.3
BOLLING ADVANCE BASE, 1934												
Winter 1934	−50.6	−28.9	−45.8	−43.0	−4.5	−36.5	−36.5	−7.3	−32.9	−43.6	−23.6	−35.4
Dark season 1934	−46.3	−21.4	−39.4	−38.6	1.2	−31.2	−33.6	−14.1	−28.4	−38.2	−22.4	−32.6
LITTLE AMERICA, 1934												
Winter 1934	−11.8	−8.4	−9.4	13.7	−5.5	−0.1	−26.3	−8.8	−15.1	−29.2	−5.9	−14.2
Dark season 1934	−17.8	−1.6	−6.0	−11.5	1.2	−2.0	−22.4	−10.7	−14.0	−26.3	−6.6	−14.0

LITTLE AMERICA, COMBINED DATA, 1929 AND 1934

	South			Southwest			West			Northwest			Calm
	V<12 m. p. h.	V≥12 m. p. h.	all velocities	V<12 m. p. h.	V≥12 m. p. h.	All velocities	V<12 m. p. h.	V≥12 m. p. h.	All velocities	V>12 m. p. h.	V≥12 m. p. h.	All velocities	
Summer	9.2	16.0	10.4	9.0	13.2	9.8	14.3	3.6	13.4	24.9	29.7	26.9	10.8
Fall	−27.4	−9.6	−25.7	−32.8	−16.9	−29.8	−29.4	−19.9	−27.3	−11.3	18.9	13.8	−35.9
Winter	−40.1	−22.6	−37.3	−40.7	−40.0	−40.6	−43.9	−44.9	−43.9	−24.0	−21.0	−23.7	−46.7
Spring	−28.2	−16.8	−26.5	−26.6	−27.1	−26.7	−30.3	−20.6	−28.7	−14.5	6.1	−8.2	−43.7
Light season	−2.8	4.4	−1.5	−6.7	−6.2	−6.5	−4.0	−12.0	−5.3	13.0	20.3	16.4	1.2
Dark season	−38.5	−24.0	−36.8	−39.7	−37.3	−39.2	−42.2	−34.1	−41.4	−28.5	−10.0	−26.2	−44.1
Year	−21.7	−6.7	−19.1	−28.4	−24.8	−27.7	−25.6	−21.3	−25.0	−7.3	16.1	0.7	−36.0
BOLLING ADVANCE BASE, 1934													
Winter 1934	−46.8	−32.4	−44.3	−47.9	−28.5	−46.0	−49.4	−32.0	−48.9	−51.8	−41.8	−50.7	−48.0
Dark season 1934	−45.2	−32.2	−43.0	−46.4	−30.2	−45.3	−46.2	−31.5	−45.7	−50.0	−33.2	−47.0	−45.3
LITTLE AMERICA, 1934													
Winter 1934	−40.8	−19.3	−37.4	−40.8	−34.2	−39.3	−45.7	−40.0	−45.3	−33.5	−19.0	−31.8	−51.5
Dark season 1934	−38.2	−22.1	−36.2	−40.3	−20.8	−38.7	−44.9	−34.8	−44.2	−36.3	−7.9	−31.6	−43.6

TABLE 27.—*Mean wind velocity with the different wind directions at Little America and Bolling Advance Base, m. p. h.*

LITTLE AMERICA, COMBINED DATA, 1929 AND 1934

	North	Northeast	East	Southeast	South	Southwest	West	Northwest
Summer	10.89	11.16	11.94	12.36	8.49	8.30	6.80	9.48
Fall	14.80	16.25	16.02	13.27	7.26	7.97	8.32	17.06
Winter	12.23	13.46	13.13	14.95	7.59	7.57	3.97	7.56
Spring	13.47	11.89	13.59	11.55	7.43	9.02	7.29	8.75
Light season	11.98	12.25	13.34	12.46	8.28	7.99	7.67	10.84
Dark season	13.36	14.08	14.32	13.81	7.03	7.68	6.59	7.08
Year	12.43	13.02	13.96	13.10	7.72	8.13	7.09	9.45
BOLLING ADVANCE BASE, 1934								
Winter	8.02	7.37	7.40	10.52	7.51	6.15	5.02	6.86
Dark season	9.50	7.89	9.13	9.98	7.34	5.87	5.45	7.56

TABLE 28.—*Percentage frequency of the different wind directions at Little America, combined data, 1929 and 1934*

	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm
January	10.14	9.64	28.82	8.54	22.54	10.95	7.23	2.00	0.14
February	.65	6.16	38.43	18.28	23.51	8.12	4.01	.09	.75
March	1.84	5.44	41.67	5.50	18.63	16.11	9.38	1.09	.34
April	2.99	4.86	37.29	8.61	24.86	14.44	3.68	----------	3.26
May	3.90	4.17	35.69	9.81	20.50	17.47	5.78	.13	2.55
June	4.51	7.92	42.22	9.31	11.94	19.31	2.43	.62	1.74
July	2.28	3.02	13.98	11.29	20.23	32.39	13.51	1.08	2.22
August	2.02	3.97	22.18	5.17	27.02	21.84	14.38	1.34	2.08
September	3.68	2.15	24.93	4.03	26.04	22.08	12.99	1.88	2.22
October	7.12	2.89	38.98	6.32	21.30	13.44	8.20	1.34	.40
November	6.60	3.40	38.82	6.46	22.15	13.26	6.88	2.01	.42
December	8.13	4.37	32.33	9.07	24.33	12.30	7.32	1.08	1.14
Year	4.80	4.99	32.61	8.33	21.92	16.78	8.06	1.11	1.40

TABLE 29.—*Mean temperature with clear and cloudy sky and with low and high wind velocities, °F., by seasons, combined data, 1929 and 1934*

LITTLE AMERICA

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Clear (0-3)			Cloudy (8-10)										
	$V<$ 12 m. p. h.	$V\geq$ 12 m. p. h.	Mean	$V<$ 12 m. p. h.	$V\geq$ 12 m. p. h.	Mean	2-1	5-4	6-3	Mean temperature for season	10-1	10-2	4-10	5-10
Summer	12.5	15.4	13.3	20.7	22.7	21.5	2.9	2.0	8.2	16.2	3.7	0.8	4.5	6.5
Autumn	−37.3	−22.1	−34.2	−16.6	−4.8	−10.3	15.2	11.8	23.9	−17.7	19.6	4.4	1.1	12.9
Winter	−45.5	−31.5	−43.1	−19.2	−6.8	−12.8	14.0	12.4	30.3	−29.2	16.3	2.3	10.0	22.4
Wing	−31.9	−12.6	−28.5	−12.1	−8.2	−10.2	19.3	3.9	18.3	−18.4	13.5	−5.8	6.3	10.2
Year	−32.1	−14.6	−28.7	−6.0	−0.5	−3.3	17.5	5.5	25.4	−12.8	19.3	1.8	6.8	12.3

TABLE 30.—*Absolute maximum and minimum temperature and highest and lowest daily mean temperature at Little America and Bolling Advance Base*

LITTLE AMERICA 1929

	January 1929 [1]	February 1929 [2]	February 1929 [3]	February 1929 [4]	March 1929	April 1929	May 1929	June 1929	July 1929	August 1929	September 1929	October 1929	November 1929	December 1929	January 1930
Absolute maximum ° F	42.4	32.2	23.3	32.2	25.0	3.7	15.0	16.0	11.0	17.0	−2.0	13.0	23.0	35.0	33.0, 33
Date	22	12	25	12	15	13	2	6	31	19	18	31	25	28	8, 12
Hour	14h	15h	12h	15h	12h	20h	21h	11h	24h	7h	6h	4h	13h	10h	14h, 12h
Wind, direction and velocity, m. p. h.	S8W. 15	NE. 21	E. 9	NE. 21	NE. 13	ENE. 13	NE. 14	SE. 22	NE. 14	E. 14	E. 27	E. 11	W. 6	SE. 2	E10, N. 9
Pressure, inches	29.39	28.77	29.43	28.77	28.85	29.48	29.31	29.24	29.41	29.59	28.28	28.94	29.90	29.57	29.23, 29.36
Cloudiness	4	10	10	10	10	10	10	9	10	10	10	10	7	5	10, 7
Absolute minimum, ° F	−6	−8.8	−21.8	−21.8	−44.0	−58.0	−51.0	−56.8	−72.2	−61.0	−67.5	−54.6	−19.0	−1.4	−6.0
Date	31	5	22	22	31	25	8	3	28	26	12	4	13	2	26
Hour	2h	24h	3h	3h	24h	4h	9h	19h	9h	23:30	2:30	19h	24n	23:30	24h
Wind, direction and velocity, m. p. h.	NE. 12	SW. 3	E. 3	E. 3	E. 2	SW. 3	0	0	S. 3	E. 2	NE. 2	SW. 3	E. 12	E. 4	SW. 7
Pressure, inches	29.22	29.10	29.48	29.48	29.19	28.90	28.85	28.49	28.98	29.08	28.71	28.59	29.29	29.20	29.23
Cloudiness	Few	5	1	1	Few	0	3	Few	Few	0	0	Few	0	Few	1
Absolute range, ° F	48.4	41.0	45.1	54.0	69.0	61.7	66.0	72.8	83.2	78.0	65.5	67.6	42.0	36.4	39.0
Highest daily mean, ° F	31.5	29.3	14.2	29.3	23.3	−2.0	9.6	10.8	−5.5	10.8	−13.0	7.3	12.4	29.2	31.2
Date	22	9	26	26	15	15	2	19	31	1	18	31	25	24	8
Wind, mean velocity, m. p. h.	5.3	13.9	11.8	13.9	15.4	7.4	11.6	14.1	18.6	11.7	18.3	7.3	7.5	10.0	9.9
Wind, prevailing direction	E	NE	E	NE	NE	S	E	N	E	NE	SE	E	SW	N	E
Mean pressure, inches	29.403	28.943	29.390	28.943	28.827	29.598	29.155	29.263	29.391	29.420	28.192	28.981	29.902	29.531	29.186
Mean cloudiness	7.4	10.0	8.7	10.0	9.6	9.7	10.0	10.0	10.0	10.0	9.7	10.0	7.9	9.6	9.5
Lowest daily mean ° F	5.7	3.8	−9.7	−9.7	−33.9	−49.6	−44.9	−52.0	−70.1	−57.8	−64.0	−46.9	−7.0	6.2	3.2
Date	31	5	22	22	31	25	15	3	28	27	1	4	11	3	30
Wind, mean velocity, m. p. h.	10.0	7.9	4.9	4.9	5.9	8.3	3.7	2.5	2.1	2.8	2.0	5.3	5.8	6.1	8.4
Wind, prevailing direction	E	S	S	S	E	E	SW	SW	S	S	S	W	S	S	W
Mean pressure, inches	29.066	29.130	29.476	29.476	29.122	28.871	28.804	28.670	29.057	28.495	28.868	28.650	29.227	29.287	29.057
Mean cloudiness	Few	3.7	4.0	4.0	4.3	4.7	0.1	0.1	Few	3.1	1.2	0.3	5.0	5.8	5.0
Range, ° F	25.8	25.5	23.9	39.0	57.2	47.6	54.5	62.8	64.6	78.6	51.0	54.2	19.0	23.0	28.0

LITTLE AMERICA 1934

	February 1934 [3]	March 1934	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934	January 1935
Absolute maximum, ° F	17	29.4	22.9	25.1	21.0	22.7	−0.2	10.0	12.0	22.7	37.9	32.7
Date	14	8	3	24	14	27	2	21	8	27	17	2
Hour	13:30	22h	18h	18h	15h	14h	19:30	15h	14h	12h	13h	12h
Wind direction and velocity, m. p. h.	S. 11	N. 14	NE. 17	SE. 22	NE. 13	N. 2	E. 6	NE. 24	NE. 35	N. 8	E. 2	SE. 17
Pressure, inches	29.59	28.89	28.14	29.34	28.48	29.84	28.39	29.19	28.46	29.07	29.37	29.59
Cloudiness	(9)	10	10	10	10	10	10	10	10	10	9	10
Absolute minimum, ° F	−28.5	−55.3	−52.9	−62.4	−53.0	−70.6	−71.3	−67.0	−45.2	−35.4	−1.3	11.8
Date	25	28	18	20	29	21	31	14	1	2	16	21
Hour	2h	6h	23h	18h	3h	16h	0:30	4h	23h	1h	2h	3h
Wind direction and velocity, m. p. h.	SW. 4	W. 7	S. 7	SW. 3	SW. 5	W. 7	S. 3	S. 5	S. 3	S. 4	W. 2	SW. 2
Pressure, inches	29.53	29.26	29.15	29.39	29.57	29.46	28.91	28.52	29.12	28.61	29.32	29.69
Cloudiness		(0)	(1)	0	1	0	0	0	Few	(4)	(4)	0
Absolute range, ° F	45.5	84.7	75.8	87.5	74.0	93.3	71.5	77.0	57.2	58.1	39.2	
Highest daily mean, ° F	10.7	20.9	10.2	17.3	20.4	18.3	−8.9	−3.6	7.5	17.8	29.6	31.4
Date	14	8	3	24	4	27	16	21	8	26	22	29
Wind, mean velocity, m. p. h.	15.1	25.1	28.8	19.0	21.2	10.8	22.9	21.9	33.2	20.5	11.8	15.6
Wind, prevailing direction	SE	NE	E	SE	E	SE	S	E	N	N	NE	NE
Mean pressure, inches	29.414	29.070	28.295	29.324	29.200	29.099	28.502	29.133	28.525	28.981	28.825	29.328
Mean cloudiness		10.0	9.9	10.0	10.0	10.0	10.0	9.8	10.0	8.7	10.0	
Lowest daily mean, ° F	−19.3	−45.8	−48.9	−58.0	−49.0	−65.3	−62.0	−62.4	−38.0	−26.5	7.1	18.5
Date	24	28	18	20	29	21	30	13	2	1	9	9
Wind, mean velocity, m. p. h.	6.1	4.2	4.9	5.2	6.0	7.1	1.9	3.7	5.0	7.6	5.4	11.6
Wind, prevailing direction	SW	SE	SW	SW	SW	SW	S	S	S	S	S	S
Mean pressure, inches	29.560	29.278	29.141	29.257	29.578	29.338	29.043	28.743	29.071	28.556	29.117	29.478
Mean cloudiness		4.0	1.5	Few	1.9	0.6	0.0	0.0	1.3	4.1	1.8	
Range, ° F	30.0	66.7	59.1	75.0	69 4	83.6	53.1	58.8	45.5	44.3	22.5	12.9

See footnotes at end of table.

TABLE 30.—*Absolute maximum and minimum temperature and highest and lowest daily mean temperature at Little America and Bolling Advance Base*—Continued

BOLLING ADVANCE BASE 1934

	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934
Absolute maximum, ° F	21	18	19	0	4	0.
Date	4	24	4	27	3	30.
Hour	4:30	22h	4h	6h	2h	14h.
Wind direction and velocity, m. p. h	NE. 26	NE. 11	SE. 9	SE. 18	E. 4	NW. 22.
Pressure, inches	28.04	29.08	28.80	28.81	28.37	28.45.
Absolute minimum, ° F	−62	−72.5	−59	[6] −78	−77, −77, −77	−72.5.
Date	18	20	28	21	20, 21, 30	8.
Hour	1h	13h	15h	4	23h, 7h, 2h	23:30.
Wind direction and velocity, m. p. h	S. 4	NW. 4	NW. 7	NW. 5	NW. 3, NE. 4, SE. 3	N. 2.
Pressure, inches	28.86	28.84	29.19	28.67	28.09, 28.17, 28.81	28.56.
Absolute range, ° F	83	91	78	78	81	72.
Highest daily mean, ° F	10.2	4.1	11.2	−10.2	−21.9	−14.2.
Date	4	25	4	27	2	23.
Wind, mean velocity, m. p. h	21.6	4.1	13.5	16.6	6.9	9.9.
Wind, prevailing direction	NE	NE., N	SE	SE	SE	NW.
Mean pressure, inches	28.242	28.988	28.959	28.850	27.959	28.514.
Lowest daily mean, ° F	−60.2	−65.7	−54.9	−77.1	−74.7	−68.3.
Date	18	20	28	21	24	13.
Wind, mean velocity, m. p. h	3.9	5.1	5.3	5.2	3.5	3.6.
Wind, prevailing direction	S	N	NW	NW	SE	S.
Mean pressure, inches	28.825	28.823	29.151	28.895	28.361	28.422.
Range, ° F	70.4	69.8	66.1	66.9	52.8	54.1.

[1] On board ship in Bay of Whales.
[2] First 15 days of February on board ship in Bay of Whales.
[3] Last 13 days of February at Little America.
[4] From combined observations for February on board ship in Bay of Whales and at Little America.
[5] Includes observations on board ship in the Bay of Whales.
[6] According to the thermograph records the lowest recorded temperature at Advance Base was −83° F. at 4h on July 21. Although there was no reading of the minimum thermometer at 8h on this date, the minimum thermometer reading at 20h of the same day is given as −78° F.; following the customary procedure, the recorded value of −83° F. has therefore been corrected to −78° F. (G. G.)

TABLE 31.—*Mean maximum and minimum temperatures and range at Little America and Bolling Advance Base, °F.*

LITTLE AMERICA, 1929

	January 1929 [1]	February 1929 [2]	February 1929 [3]	February 1929 [4]	March 1929	April 1929	May 1929	June 1929	July 1929	August 1929	September 1929	October 1929	November 1929	December 1929	January 1930	Year 1929 [5]
Mean maximum	28. 9	24. 8	10. 2	17. 8	4. 2	−20. 6	−13. 1	−1. 1	−32. 8	−17. 0	−34. 4	−8. 6	9. 0	25. 5	23. 7	−3. 9
Mean minimum	12. 7	10. 7	−6. 3	2. 5	−15. 4	−37. 8	−32. 0	−20. 5	−56. 4	−38. 4	−53. 2	−29. 2	−7. 6	12. 4	12. 8	−22. 1
Mean range	16. 2	14. 1	16. 5	15. 3	19. 6	17. 2	18. 9	19. 4	23. 5	21. 4	18. 8	20. 6	16. 6	13. 1	10. 9	18. 2

LITTLE AMERICA, 1934

	February 1934 [6]	March 1934	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934	January 1935	Year 1934
Mean maximum	6. 4	−3. 4	−6. 7	−10. 3	−4. 6	−24. 7	−27. 1	−20. 1	−6. 0	4. 6	24. 0	28. 2	−3. 6
Mean minimum	10. 5	−26. 8	−26. 0	−28. 8	−23. 3	−48. 0	−49. 6	−47. 2	−25. 3	−11. 2	9. 1	19. 1	−22. 7
Mean range	16. 9	23. 4	19. 3	18. 5	18. 7	23. 3	22. 5	27. 1	19. 3	15. 8	14. 9	9. 1	19. 1

LITTLE AMERICA, COMBINED DATA, 1929 AND 1934

	January 1929, 1930, 1935	February 1929, 1934	March 1929, 1934	April 1929, 1934	May 1929, 1934	June 1929, 1934	July 1929, 1934	August 1929, 1934	September 1929, 1934	October 1929, 1934	November 1929, 1934	December 1929, 1934	Year 1929, 1934
Mean maximum	27. 0	13. 1	0. 4	−13. 6	−11. 7	−2. 8	−28. 8	−22. 0	−27. 2	−7. 3	6. 8	24. 7	−3. 8
Mean minimum	14. 9	−2. 8	−21. 1	−31. 9	−30. 4	−21. 9	−52. 2	−44. 0	−50. 2	−27. 2	−9. 4	10. 8	−22. 5
Mean range	12. 1	15. 9	21. 5	18. 3	18. 7	19. 1	23. 4	22. 0	23. 0	19. 9	16. 2	13. 9	18. 7

ADVANCE BASE, 1934

	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	Mean, April-September
Mean maximum	−21. 7	−20. 4	−13. 1	−42. 7	−35. 5	−32. 2	−27. 7
Mean minimum	−42. 0	−41. 2	−35. 0	−59. 4	−57. 8	−53. 0	−48. 2
Mean range	20. 3	20. 8	21. 9	16. 7	22. 3	20. 8	20. 5

See footnotes at end of table.

TABLE 31.—*Mean maximum and minimum temperatures and range at Little America and Bolling Advance Base, °F.*—Continued

LITTLE AMERICA

	Summer		Fall		Winter		Spring	
	1929	1934	1929	1934	1929	1934	1929	1934
Mean maximum	23.4	21.5	−9.7	−6.8	−17.2	−19.0	−11.3	−8.2
Mean minimum	9.5	8.3	−28.3	−27.2	−38.6	−40.5	−30.0	−27.3
Mean range	13.9	13.2	18.6	20.4	21.4	21.5	18.7	19.1

LITTLE AMERICA COMBINED DATA, 1929 AND 1934

	Summer	Fall	Winter	Spring
Mean maximum	22.5	−8.2	−18.1	−9.2
Mean minimum	9.0	−27.7	−39.5	−28.7
Mean range	13.5	19.5	21.4	19.5

LITTLE AMERICA

	Light season			Dark season		
	1929	1934	Combined data	1929	1934	Combined data
Mean maximum	12.2	9.2	10.5	−19.8	−15.7	−17.8
Mean minimum	−4.2	−7.1	−5.6	−39.8	−37.3	−38.5
Mean range	16.4	16.3	16.1	20.0	21.6	20.7

ADVANCE BASE, 1931

	Winter	Dark season
Mean maximum	−31.0	−27.7
Mean minimum	−51.4	−48.2
Mean range	20.4	20.5

[1] On board ship in Bay of Whales.
[2] First 15 days of February on board ship in Bay of Whales.
[3] Last 13 days of February at Little America.
[4] From combined observations for February on boardship in Bay of Whales and at Little America.
[5] Includes observations on board ship in the Bay of Whales.
[6] For the last 19 days in February.

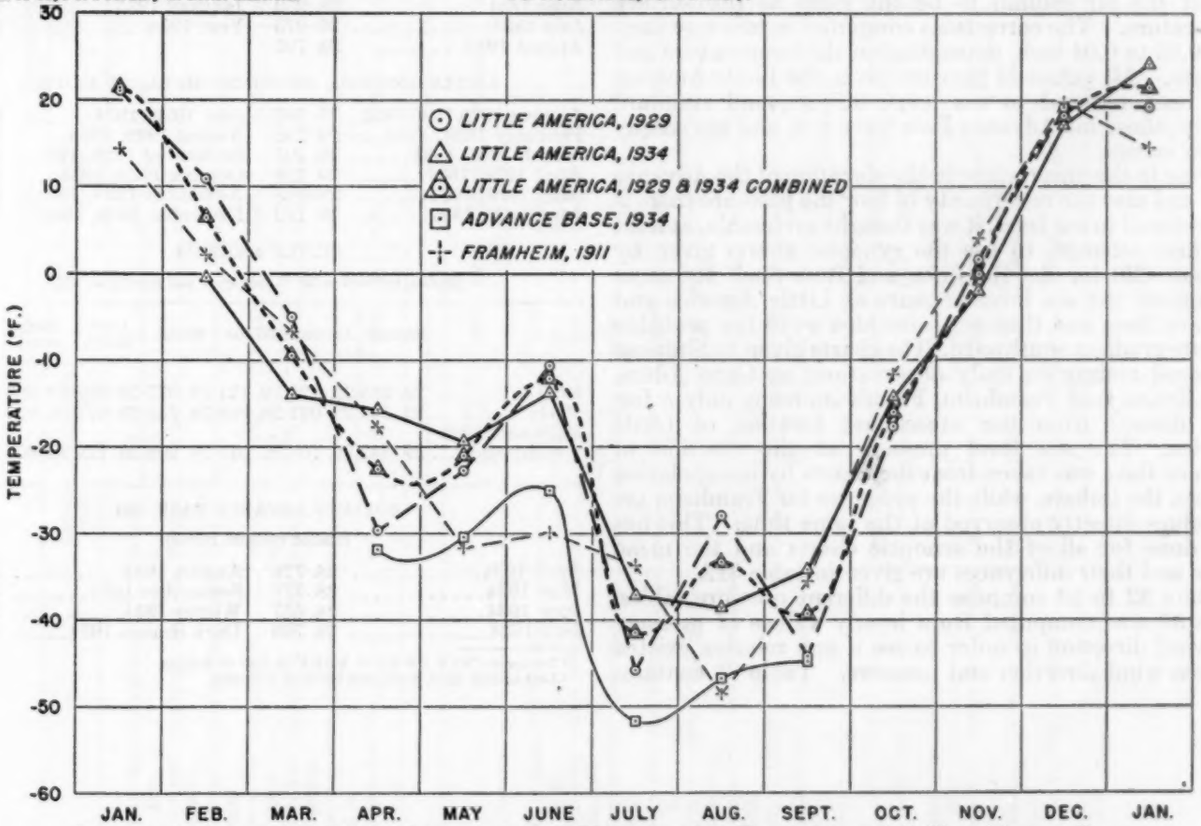

FIGURE 123.—Annual variation of temperature at Little America, Framheim, and Bolling Advance Base.

4. PRESSURE

The mercurial barometers used on the expeditions were of the standard type used by the United States Weather Bureau and described in (7). Each expedition had two of these barometers; and on the second expedition three additional barometers were loaned by the Precision Instrument Co. of Philadelphia, Pa. Before leaving the United States, each instrument was compared with a standard barometer and the instrumental error determined.

Upon reaching Little America, comparative readings were made to detect any errors which might have resulted from the long journey, but owing to the very careful handling no indication of error was found. The barometer with the smallest instrumental error was used as a standard for the daily observations and was checked at intervals by comparative readings with the other instruments. The results of these comparisons did not justify any change in the instrumental correction to the standard.

A mercurial barometer was very carefully packed and sent along for use at the Bolling Advance Base, but was broken either while enroute or while the base was being established, so that the pressure readings there had to be made with an aneroid barometer which had been carefully checked and adjusted before it left Little America. The barograph at Advance Base was corrected by use of the aneroid readings, which could be made to the nearest 0.01 inch. At Little America the barograph was corrected by means of the readings of the mercurial barometer, which were made three times daily and to the nearest 0.001 inch.

On both expeditions the barometers at Little America had identical positions and were 30 feet above sea level. The pressures at this station have been reduced to sea level by using this figure for the elevation, and the current surface temperature, and by assuming the mean temperature of the air column to be the same as the surface temperature. The corrections computed in this way vary from 0.03 to 0.04 inch, depending on the temperature and pressure. All values of pressure given for Little America have been reduced to sea level, 32° F., and standard gravity; those for Advance Base have not, and are simply station values.

Owing to the uncertainty in the elevation of the Advance Base, and also the uncertainty of how the pressure there is best reduced to sea level, it was thought preferable, at least as a first attempt, to use the synoptic charts given by Simpson (20) for the Ross Sea and Ross Shelf Ice areas to compare the sea level pressure at Little America and Advance Base and thus get some idea as to the probable pressure gradient southward. The charts given by Simpson are based mainly on daily observations at Cape Adare, Cape Evans, and Framheim, Framheim being only a few miles distant from the subsequent location of Little America. The sea level pressure at the position of Advance Base was taken from the charts by interpolation between the isobars, while the pressures for Framheim are the values directly observed at the same time. This has been done for all of the synoptic charts and the mean values and their differences are given in table 31A.

Tables 32 to 36 comprise the different pressure tables. Table 35 was computed from hourly values of pressure and wind direction in order to see if any relation existed between wind direction and pressure. Table 36 contains the mean pressure for each 10-day period for the 2 years at Little America and 6 months at Bolling Advance Base. These values may be of some use in the study of pressure surges in the Antarctic.

TABLE 31A.—*Mean sea-level pressure at Framheim and at the position of Advance Base, based on Simpson's synoptic charts*

[Pressure, sea-level, inches]

Season	Number of observations	Framheim	Position of Advance Base	Difference Advance Base—Framheim
Summer	64	29. 683	29. 724	0. 041
Autumn	122	29. 086	29. 122	. 036
Winter	184	28. 928	29. 002	. 074
Spring	182	29. 028	29. 091	. 063
Year	552	28. 979	29. 036	. 057

TABLE 32.—*Mean monthly and seasonal means of pressure at Little America and Bolling Advance Base, inches*

LITTLE AMERICA, 1929

[Inches, reduced to 32° F., sea level, and gravity at 45°]

January 1929 [1]	29. 419	August 1929	29. 093
February 1929	29. 197	September 1929	28. 967
March 1929	29. 190	October 1929	28. 881
April 1929	29. 270	November 1929	29. 391
May 1929	28. 908	December 1929	29. 604
June 1929	29. 308	January 1930	29. 253
July 1929	28. 967	Year 1929	29. 175

LITTLE AMERICA, 1934

February 1934 [2]	29. 310	September 1934	28. 829
March 1934	29. 220	October 1934	28. 654
April 1934	28. 981	November 1934	28. 736
May 1934	29. 068	December 1934	29. 118
June 1934	28. 950	January 1935	29. 487
July 1934	29. 073	Year 1934	29. 000
August 1934	28. 703		

LITTLE AMERICA, COMBINED DATA, 1929 AND 1934

January 1929, 1930, 1935	29. 387	July 1929, 1934	29. 020
February 1929, 1934	29. 239	August 1929, 1934	28. 898
March 1929, 1934	29. 205	September 1929, 1934	28. 900
April 1929, 1934	29. 126	October 1929, 1934	28. 767
May 1929, 1934	28. 988	November 1929, 1934	29. 063
June 1929, 1934	29. 129	December 1929, 1934	29. 361

LITTLE AMERICA

[Inches, reduced to 32° F., sea level, and gravity at 45°]

	Summer	Autumn	Winter	Spring	Light season	Dark season	Year
1929	29. 385	29. 121	19. 121	29. 077	29. 267	29. 084	29. 175
1934	29. 304	29. 091	28. 908	28. 738	29. 071	28. 934	29. 000
1929 and 1934 combined	29. 347	29. 106	29. 015	28. 908	29. 172	29. 009	29. 089

BOLLING ADVANCE BASE, 1934

[Station pressure, inches]

April 1934	28. 726	August 1934	28. 374
May 1934	28. 776	September 1934	28. 503
June 1934	28. 657	Winter 1934	28. 601
July 1934	28. 760	Dark Season 1934	28. 636

[1] On board CITY OF NEW YORK in Bay of Whales.
[2] Last sixteen days, seventeen hours of February.

TABLE 33.—*Highest and lowest mean daily pressure and corresponding wind data, by months at Little America and Bolling Advance Base*

LITTLE AMERICA, 1929

[Pressure reduced to sea level, 32° F. and gravity at 45°, inches. Velocities in miles per hour]

	January 1929	February 1929	March 1929	April 1929	May 1929	June 1929	July 1929	August 1929	September 1929	October 1929	November 1929	December 1929	January 1930
Highest mean daily pressure	29.755	29.467	29.589	29.709	29.348	29.977	29.491	29.769	29.815	29.384	30.050	29.848	29.715
Date	3	22	17	18	3	27	1	20	6	20	24	12	21
Mean wind velocity and previous direction.	E. 7.8	S. 4.9	SW. 9.9	SW. 4.8	E. 8.8	E. 11.2	SW. 7.2	W. 4.4	SW. 7.4	E. 11.4	E. 13.1	SW. 5.7	E. 8.5
Maximum wind velocity and direction.	E. 15	S. 12	SW. 21	SW. 12	E. 24	E. 24	SW. 12	E. 15	SW. 15	E. 17	E. 19	W. 10	E. 19
Lowest mean daily pressure	29.030	28.795	28.826	28.871	28.420	28.670	28.447	27.907	28.192	28.325	28.948	29.287	28.930
Date	18	12	29	25	27	3	26	16	18	6	7	3	29
Mean wind velocity and previous direction.	S. 14.9	NE. 18.7	E. 5.9	E. 8.3	E. 7.6	SW. 2.5	W. 10.5	E. 24.8	SE. 18.3	S. 10.1	E. 7.6	S. 6.1	S. 11.8
Maximum wind velocity and direction.	S. 24	NE. 38	E. 13	E. 21	E. 22	NE. 9	SW. 15	SE. 40	SE. 36	S. 18	E. 21	S. 9	S. 22
Range in pressure	0.725	0.672	0.763	0.838	0.928	1.307	1.044	1.772	1.623	1.059	11.02	0.561	0.785

LITTLE AMERICA, 1934

		February 1934 [1]	March 1934	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934	January 1935
Highest mean daily pressure		29.579	29.632	29.264	29.534	29.645	29.732	29.186	29.500	29.126	29.040	29.382	29.948
Date		12	25	20	5	30	23	29	22	27	27	16	22
Mean wind velocity and previous direction.		SE. 19.0	SW. 12.0	S. 8.6	E. 3.5	SW. 9.8	S. 7.7	E; SE. 5.5	E. 5.1	SW. 7.2	N. 13.2	W. 5.5	NW. 8.0
Maximum wind velocity and direction.		SE. 31	SW. 32	E. 26	E. 11	SW. 17	SE. 23	E. 13	SE. 11	SW. 17	E. 21	NE. 11	SW. 16
Lowest mean daily pressure		29.033	28.806	28.295	28.433	28.397	28.331	28.096	28.013	28.067	28.418	28.784	29.008
Date		22	3	3	14	15	16	27	3	5	16	25	1
Mean wind velocity and previous direction.		S. 6.5	SE. 16.0	E. 28.8	S. 18.4	E. 13.3	SW. 12.8	W. 8.9	S. 12.2	E. 20.3	S. 9.4	E. 7.2	E. 10.4
Maximum wind velocity and direction.		SE. 19	SE. 29	E. 47	E. 47	E. 24	SW. 17	E. 33	S. 34	E. 34	SW. 19	E. 15	E. 22
Range in pressure		0.546	0.726	0.969	1.101	1.248	1.401	1.090	1.487	1.059	0.622	0.598	0.940

BOLLING ADVANCE BASE, 1934

	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934
Highest mean daily pressure	29.047	29.259	29.230	29.506	28.828	29.139
Date	20	5	30	24	29	22
Mean wind velocity and previous direction.	SE. 8.6	NW. 2.0	W; SW. 8.0	SE. 17.2	N. 4.2	SW. 6.8
Maximum wind velocity and direction.	SE. 11	NW. 4	SW. 13	SE. 27	N. 7	NW 17.
Lowest mean daily pressure	28.149	28.206	28.110	28.056	27.680	27.747
Date	3	14	15	16	27	3
Mean wind velocity and previous direction.	NE. 20.6	S; SW. 7.9	E; S. 7.9	SW. 9.8	SE. 7.3	S. 69
Maximum wind velocity and direction.	N. 35	S. 11	E. 15	S. 14	N. 14	S. 16
Range in pressure	0.898	1.053	1.120	1.450	1.148	1.392

[1] For the last 17 days of February 1934.

TABLE 34.—*Absolute maximum and minimum pressures and range by months, inches*

LITTLE AMERICA 1929

[Pressure reduced to sea level, 32° F. and gravity at 45°, inches]

	January 1929	February 1929	March 1929	April 1929	May 1929	June 1929	July 1929	August 1929	September 1929	October 1929	November 1929	December 1929	January 1930
Absolute maximum	29. 78	29. 51	29. 69	29. 75	29. 37	30. 04	29. 53	29. 85	29. 86	29. 45	30. 07	29. 90	29. 76
Date	3	21, 22	17	18	3	27	1	19, 20	6, 7	20	23, 24	12	21
Absolute minimum	28. 94	28. 74	28. 76	29. 83	28. 35	28. 49	28. 18	27. 86	28. 05	28. 29	28. 92	29. 20	28. 88
Date	29	12	15, 24, 30	9	27	3	5	16	18	6	7	2, 3	29
Range	0. 84	0. 77	0. 93	0. 92	1. 02	1. 55	1. 35	1. 99	1. 81	1. 16	1. 15	0. 70	0. 88

LITTLE AMERICA, 1934

	February 1934	March 1934	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934	January 1935
Absolute maximum	29. 64	29. 70	29. 41	29. 56	29. 67	29. 93	29. 22	29. 57	29. 31	29. 08	29. 42	29. 99
Date	12	25	1	5	28, 30	23	29	22	27	27	16	22
Absolute minimum	28. 98	28. 69	28. 08	28. 35	28. 36	28. 29	27. 93	27. 93	27. 68	28. 22	28. 73	28. 87
Date	22	3	3	14	15	16	27	3	5, 6	13	25	1
Range	0. 66	1. 01	1. 33	1. 21	1. 31	1. 64	1. 29	1. 64	1. 63	. 86	. 69	1. 12

BOLLING ADVANCE BASE, 1934

[Station pressure, inches]

	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934
Absolute maximum	29. 13	29. 31	29. 27	29. 65	28. 86	29. 24
Date	1	5	30	24	29	22
Absolute minimum	27. 93	28. 16	28. 04	27. 94	27. 52	27. 62
Date	3	15	15	16	27	3
Range	1. 20	1. 15	1. 23	1. 71	1. 34	1. 62

TABLE 35.—*Mean pressure with the different wind directions by seasons at Little America and Bolling Advance Base*

LITTLE AMERICA, 1929

[Inches, reduced to 32° F., sea level, and gravity at 45°]

	1 N.	2 NE.	3 E.	4 SE.	5 S.	6 SW.	7 W.	8 NW.	9 Calm	10 All directions	1-10	2-10	3-10	4-10	5-10	6-10	7-10	8-10	9-10
Summer:																			
Mean pressure	29.401	29.141	29.359	29.404	29.363	29.462	29.419	29.506	29.573	29.373	+0.028	−0.232	−0.014	+0.031	−0.010	+0.089	+0.046	+0.133	+0.200
Autumn:																			
Mean pressure	29.063	29.094	29.122	29.059	29.133	29.113	29.100	.....	29.129	29.121	−.058	−.027	+.001	−.062	+.012	−.008	−.021	.....	+.008
Winter:																			
Mean pressure	29.168	29.140	29.210	28.984	29.111	29.063	29.015	29.006	29.008	29.121	+.047	+.019	+.089	+.037	−.010	−.058	−.016	−.115	−.113
Spring:																			
Mean pressure	29.201	29.117	29.161	28.984	28.991	29.093	29.058	29.454	29.219	29.077	+.124	+.040	+.084	−.093	−.086	+.016	−.019	+.377	+.142
Light season:																			
Mean pressure	29.338	29.113	29.284	29.318	29.242	29.359	29.278	29.484	29.517	29.277	+.061	−.164	+.007	+.041	−.035	+.082	+.001	+.207	+.240
Dark season:																			
Mean pressure	29.162	29.157	29.120	28.986	29.070	29.057	29.041	29.090	29.089	29.084	+.078	+.073	+.036	−.098	−.014	−.027	−.043	+.006	+.005
Year:																			
Mean pressure	29.274	29.131	29.307	29.205	29.161	29.161	29.170	29.269	29.139	29.188	+.086	−.057	+.119	+.017	−.027	−.027	−.017	+.081	−.049

LITTLE AMERICA, 1934

Summer:																			
Mean pressure	29.280	29.255	29.206	29.294	29.327	29.378	29.357	29.530	29.277	29.304	−0.024	−0.049	−0.098	−0.010	+0.023	+0.074	+0.053	+0.226	−0.027
Autumn:																			
Mean pressure	29.096	28.964	29.093	29.098	29.074	29.131	29.190	29.269	29.259	29.091	+.005	−.127	+.002	+.007	−.017	+.040	+.099	+.178	+.168
Winter:																			
Mean pressure	28.790	28.842	28.876	29.047	28.846	28.907	28.967	28.878	28.895	28.908	−.118	−.066	−.032	+.055	−.062	−.001	+.059	−.030	−.013
Spring:																			
Mean pressure	28.686	28.550	28.757	28.730	28.727	28.694	28.832	28.737	28.973	28.738	−.052	−.188	+.019	−.008	−.011	−.044	+.094	−.001	+.135
Light season:																			
Mean pressure	29.019	29.076	29.026	29.121	29.091	29.073	29.119	29.116	29.025	29.071	−.052	+.005	−.045	+.050	+.020	+.002	+.048	+.045	−.046
Dark season:																			
Mean pressure	28.823	28.820	28.945	29.227	28.927	28.925	28.965	28.917	29.105	28.934	−.111	−.114	+.011	+.293	−.007	−.009	+.031	−.017	+.171
Year:																			
Mean pressure	28.961	28.959	28.985	29.179	29.009	28.984	29.026	29.053	29.071	29.000	−.039	−.041	−.015	+.179	+.009	−.016	+.026	+.053	+.071

LITTLE AMERICA, COMBINED DATA—1929 AND 1934

Summer:																			
Mean pressure	29.349	29.178	29.306	29.351	29.348	29.428	29.394	29.524	29.478	29.346	+0.003	−0.168	−0.040	+0.005	+0.002	+0.082	+0.048	+0.178	+0.132
Autumn:																			
Mean pressure	29.082	29.014	29.108	29.113	29.107	29.122	29.147	29.269	29.143	29.106	−.024	−.092	+.002	+.007	+.001	+.016	+.041	+.163	+.037
Winter:																			
Mean pressure	29.041	29.058	29.069	29.031	28.991	28.979	28.980	28.935	28.991	29.015	+.026	+.043	+.054	+.016	−.024	−.036	−.035	−.080	−.024
Spring:																			
Mean pressure	28.825	28.810	28.967	28.850	28.871	28.907	28.925	28.812	29.147	28.908	−.083	−.098	+.059	−.058	−.037	−.001	+.017	−.096	+.239
Light season:																			
Mean pressure	29.162	29.099	29.046	29.215	29.177	29.209	29.198	29.174	29.300	29.185	−.023	−.086	−.139	+.030	−.008	+.024	+.013	−.011	+.115
Dark season:																			
Mean pressure	29.000	29.008	29.033	29.159	29.006	28.995	28.992	28.973	29.091	29.009	−.009	−.001	+.024	+.150	−.003	−.014	−.017	−.036	+.082
Year:																			
Mean pressure	29.109	29.060	29.117	29.189	29.094	29.074	29.086	29.100	29.127	29.099	+.010	−.039	+.018	+.090	−.005	−.025	−.013	+.001	+.028

BOLLING ADVANCE BASE, 1934

Station pressure, inches

Winter:																			
Mean pressure	28.514	28.456	28.558	28.715	28.592	28.540	28.701	28.538	28.650	28.601	−0.087	−0.155	−0.043	+0.114	−0.009	−0.061	+0.100	−0.063	+0.049
Dark season:																			
Mean pressure	28.562	28.439	28.703	28.701	28.543	28.574	28.637	28.545	28.751	28.636	−.074	−.197	+.067	+.065	−.093	−.062	+.001	−.091	+.115

TABLE 36.—*Mean pressure for 10-day intervals at Little America and Bolling Advance Base, inches*

LITTLE AMERICA, 1929

Dates inclusive		Mean sea-level pressure
From—	To—	
Jan. 1, 1929	Jan. 10, 1929	29.608
Jan. 11, 1929	Jan. 20, 1929	29.405
Jan. 21, 1929	Jan. 31, 1929	29.259
Feb. 1, 1929	Feb. 10, 1929	29.148
Feb. 11, 1929	Feb. 20, 1929	29.138
Feb. 21, 1929	Feb. 28, 1929	29.332
Mar. 1, 1929	Mar. 10, 1929	29.318
Mar. 11, 1929	Mar. 20, 1929	29.222
Mar. 21, 1929	Mar. 31, 1929	29.043
Apr. 1, 1929	Apr. 10, 1929	29.214
Apr. 11, 1929	Apr. 20, 1929	29.448
Apr. 21, 1929	Apr. 30, 1929	29.148
May 1, 1929	May 10, 1929	29.056
May 11, 1929	May 20, 1929	28.848
May 21, 1929	May 31, 1929	28.827
June 1, 1929	June 10, 1929	29.081
June 11, 1929	June 20, 1929	29.224
June 21, 1929	June 30, 1929	29.620
July 1, 1929	July 10, 1929	29.060
July 11, 1929	July 20, 1929	28.898
July 21, 1929	July 31, 1929	28.945
Aug. 1, 1929	Aug. 10, 1929	29.287
Aug. 11, 1929	Aug. 20, 1929	29.020
Aug. 21, 1929	Aug. 31, 1929	28.982
Sept. 1, 1929	Sept. 10, 1929	29.352
Sept. 11, 1929	Sept. 20, 1929	28.854
Sept. 21, 1929	Sept. 30, 1929	28.696
Oct. 1, 1929	Oct. 10, 1929	28.668
Oct. 11, 1929	Oct. 20, 1929	29.041
Oct. 21, 1929	Oct. 31, 1929	28.928
Nov. 1, 1929	Nov. 10, 1929	29.083
Nov. 11, 1929	Nov. 20, 1929	29.440
Nov. 21, 1929	Nov. 30, 1929	29.649
Dec. 1, 1929	Dec. 10, 1929	29.535
Dec. 11, 1929	Dec. 20, 1929	29.766
Dec. 21, 1929	Dec. 31, 1929	29.519
Jan. 1, 1930	Jan. 10, 1930	29.210
Jan. 11, 1930	Jan. 20, 1930	29.335
Jan. 21, 1930	Jan. 31, 1930	29.218
Feb. 1, 1930	Feb. 4, 1930	29.146

LITTLE AMERICA, 1934

Feb. 1, 1934	Feb. 10, 1934	
Feb. 11, 1934	Feb. 20, 1934	
Feb. 21, 1934	Feb. 28, 1934	29.271
Mar. 1, 1934	Mar. 10, 1934	29.112
Mar. 11, 1934	Mar. 20, 1934	29.231
Mar. 21, 1934	Mar. 31, 1934	29.307
Apr. 1, 1934	Apr. 10, 1934	28.944
Apr. 11, 1934	Apr. 20, 1934	29.059
Apr. 21, 1934	Apr. 30, 1934	28.940

TABLE 36.—*Mean pressure for 10-day intervals at Little America and Bolling Advance Base, inches*—Continued

LITTLE AMERICA, 1934—Continued

Dates inclusive		Mean sea-level pressure
From—	To—	
May 1, 1934	May 10, 1934	29.155
May 11, 1934	May 20, 1934	28.951
May 21, 1934	May 31, 1934	29.096
June 1, 1934	June 10, 1934	29.029
June 11, 1934	June 20, 1934	28.766
June 21, 1934	June 30, 1934	29.055
July 1, 1934	July 10, 1934	29.161
July 11, 1934	July 20, 1934	28.869
July 21, 1934	July 31, 1934	29.179
Aug. 1, 1934	Aug. 10, 1934	28.748
Aug. 11, 1934	Aug. 20, 1934	28.644
Aug. 21, 1934	Aug. 31, 1934	28.716
Sept. 1, 1934	Sept. 10, 1934	28.624
Sept. 11, 1934	Sept. 20, 1934	28.862
Sept. 21, 1934	Sept. 30, 1934	29.000
Oct. 1, 1934	Oct. 10, 1934	28.644
Oct. 11, 1934	Oct. 20, 1934	28.576
Oct. 21, 1934	Oct. 31, 1934	28.732
Nov. 1, 1934	Nov. 10, 1934	28.821
Nov. 11, 1934	Nov. 20, 1934	28.532
Nov. 21, 1934	Nov. 30, 1934	28.853
Dec. 1, 1934	Dec. 10, 1934	29.130
Dec. 11, 1934	Dec. 20, 1934	29.284
Dec. 21, 1934	Dec. 31, 1934	28.956
Jan. 1, 1935	Jan. 10, 1935	29.564
Jan. 11, 1935	Jan. 20, 1935	29.461
Jan. 21, 1935	Jan. 31, 1935	29.441

ADVANCE BASE, 1934

Mar. 28, 1934	Mar. 31, 1934	29.048
Apr. 1, 1934	Apr. 10, 1934	28.669
Apr. 11, 1934	Apr. 20, 1934	28.806
Apr. 21, 1934	Apr. 30, 1934	28.702
May 1, 1934	May 10, 1934	28.862
May 11, 1934	May 20, 1934	28.638
May 21, 1934	May 31, 1934	28.823
June 1, 1934	June 10, 1934	28.682
June 11, 1934	June 20, 1934	28.475
June 21, 1934	June 30, 1934	28.721
July 1, 1934	July 10, 1934	28.842
July 11, 1934	July 20, 1934	28.505
July 21, 1934	July 31, 1934	28.922
Aug. 1, 1934	Aug. 10, 1934	28.410
Aug. 11, 1934	Aug. 20, 1934	28.271
Aug. 21, 1934	Aug. 31, 1934	28.435
Sept. 1, 1934	Sept. 10, 1934	28.337
Sept. 11, 1934	Sept. 20, 1934	28.530
Sept. 21, 1934	Sept. 30, 1934	28.620
Oct. 1, 1934	Oct. 7, 1934	28.387

5. WIND

Continuous automatic records of wind direction and velocity were made at Little America and Advance Base. At both stations the height of the anemometer above the snow surface was about 15 feet, and at Little America the exposure was identical on the two expeditions. Various results obtained from the automatic records are given in the following tables; 4-cup anemometers were used on the first expedition, and 3-cup on the second. All recorded velocities have been corrected according to the following table of corrections:

Table of corrections applied to indicated velocities

[Corrections applied to wind velocities determined by anemometers; correction added when the sign is plus and subtracted when the sign is minus]

By 3-cup anemometer, m. p. h.	By 4-cup anemometer, m. p. h.	Correction in whole miles per hour
0 to 16	0 to 8	+1
17 to 26	9 to 12	0
27 to 35	13 to 16	−1
36 to 44	17 to 20	−2
45 to 52	21 to 24	−3
53 to 61	25 to 28	−4
62 to 70	29 to 32	−5
71 to 79	33 to 36	−6
80 to 87	37 to 39	−7
88 to 96	40 to 43	−8
97 to 105	44 to 47	−9
106 to 114	48 to 51	−10
115 to 122	52 to 54	−11
123 to 132	55 to 58	−12
133 to 139	59 to 62	−13
140 to 149	63 to 65	−14
150 to 157	66 to 69	−15
158 to 166	70 to 73	−16
167 to 174	74 to 77	−17
175 to 184	78 to 80	−18
185 to 192	81 to 84	−19
193 to 200	85 to 88	−20
	89 to 91	−21
	92 to 95	−22
	96 to 99	−23
	100 to 103	−24
	104 to 106	−25
	107 to 110	−26
	111 to 114	−27
	115 to 117	−28
	118 to 121	−29
193 to 200	122 to 125	−30
	126 to 128	−31
	129 to 132	−32
	133 to 136	−33
	137 to 140	−34
	141 to 143	−35

In table 37 the absolute maximum velocity is defined as the velocity corresponding to the mile of wind passage in the shortest time. The prevailing direction is determined from the hourly values of wind direction for the period in question and is defined as that direction for which the hourly values have the greatest frequency. The mean wind velocities with the different wind directions given in table 38 have likewise been computed from hourly values of direction and velocity.

Tables 39, 40, and 42 have all been computed from hourly values. In table 40 the mean direction, resultant direction and velocity and stability have been computed in the same manner as described above for the pilot-balloon ascents. Table 41 gives the mean maximum velocity with the different wind directions, computed from the values of the maximum direction and velocity for each day. The percentage frequency of cases when the daily maximum occurred with the different directions is also given. The number of days in each month with light and strong winds is given in table 41A, in which a strong wind was arbitrarily defined as that in which the mean daily velocity was equal to or greater than 20.0 miles per hour, and a light wind as that in which the mean velocity for the day was less than or equal to 5.0 miles per hour. There is also given the number of days when the absolute maximum velocity was equal to or greater than 30.0 miles per hour. The definition of maximum velocity has already been given above. Table 42, which was computed from hourly values, gives the frequency distribution of the different wind velocities and was computed in order to compare the wind characteristics at Little America with those at McMurdo Sound.

TABLE 37.—*Mean maximum and absolute maximum wind velocities at Little America and Bolling Advance Base, m. p. h.*

LITTLE AMERICA, 1929

	January 1929	February 1929	March 1929	April 1929	May 1929	June 1929	July 1929	August 1929	September 1929	October 1929	November 1929	December 1929	January 1930
Mean velocity, m. p. h.	9.5	11.1	12.9	8.4	8.8	10.1	7.9	8.9	8.2	9.1	9.2	8.6	9.7
Mean maximum velocity, m. p. h.	16.9	19.2	23.3	17.4	17.9	20.2	18.6	17.2	16.7	15.6	16.6	14.0	15.7
Absolute maximum, direction and velocity, m. p. h.	SE. 46	NE. 38	E. 53	E. 30	E. 35	NE. 40	SE. 54	NE. 44	E. 36	E. 29	E. 22	E. 25	E. 28
Date	10	12	9	26	1	25	5	17	18	12	14	20	28
Prevailing direction	S.	E.	E.	E.	E.	E.	SW.	E.	SW.	E.	E.	E.	E.

LITTLE AMERICA, 1934

	February 1934	March 1934	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934	January 1935
Mean velocity, m. p. h.	13.0	14.3	14.3	12.1	12.0	11.0	8.8	11.5	13.4	11.2	8.9	11.8
Mean maximum velocity, m. p. h.	23.7	27.2	26.5	24.2	23.6	22.1	19.7	23.0	23.7	20.2	16.4	19.5
Absolute maximum, direction and velocity, m. p. h.	SE. 40	NE. 42	E. 47	E. 47, SE. 47	SW. 36	SE. 59	E. 45	E. 45	SE. 49	N. 34	E. 30	E. 29
Date	21	7, 8	3	14, 22	6	22	28	20	28	25	25	26
Prevailing direction	SE.	E.	E.	E.	E.	SE.	E.	E.	E.	E.	E.	E.

LITTLE AMERICA, COMBINED DATA, 1929 AND 1934

	January	February	March	April	May	June	July	August	September	October	November	December
Mean velocity, m. p. h.	10.34	11.84	13.57	11.37	10.42	11.04	9.44	8.84	9.89	11.22	10.21	8.76
Mean maximum velocity, m. p. h.	17.37	20.91	25.24	21.97	21.02	21.88	20.35	18.45	19.82	19.68	18.10	15.18
Absolute maximum, direction and velocity, m. p. h.	SE. 46	SE. 40	E. 53	E. 47	E. 47, SE. 47	NE. 40	SE. 59	E. 45	E. 45	SE. 49	N. 34	E. 30
Prvailing direction	E.	E.	E.	E.	E.	E.	SW.	E.	E.	E.	E.	E.

LITTLE AMERICA, 1929

	Summer	Fall	Winter	Spring	Light season	Dark season	Year
Mean velocity, m. p. h.	9.76	10.02	8.94	8.83	10.08	8.71	9.39
Mean maximum velocity, m. p. h.	16.42	19.53	18.64	16.30	17.48	17.98	17.73
Absolute maximum, direction and velocity, m. p. h.	SE. 46	E. 53	SE. 54	E. 36	E. 53	SE. 54	SE. 54
Prevailing direction	E.	E.	E.	E.	E.	E.	E.

LITTLE AMERICA, 1934

	Summer	Fall	Winter	Spring	Light season	Dark season	Year
Mean velocity, m. p. h.	10.89	13.56	10.57	12.06	12.01	11.60	11.80
Mean maximum velocity, m. p. h.	19.15	25.97	21.78	22.32	21.63	23.16	22.42
Absolute maximum, direction and velocity	SE. 40	E. 47, SE. 47	SE. 59	SE. 49	SE. 49	SE. 59	SE. 59
Prevailing direction	E.	E.	E.	E.	E.	E.	E.

LITTLE AMERICA, COMBINED DATA, 1929 AND 1934

	Summer	Fall	Winter	Spring	Light season	Dark season	Year
Mean velocity, m. p. h.	10.29	11.79	9.76	10.45	11.15	10.16	10.58
Mean maximum velocity, m. p. h.	17.70	22.75	20.21	19.31	19.49	20.57	20.04
Absolute maximum, direction and velocity, m. p. h.	SE. 46	E. 53	SE. 59	SE. 49	E. 53	SE. 59	SE. 59
Prevailing direction	E.	E.	E.	E.	E.	E.	E.

BOLLING ADVANCE BASE, 1934

	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	Winter 1934	Dark season 1934
Mean velocity, m. p. h.	9.5	7.2	8.9	8.0	6.6	8.1	8.13	8.06
Mean maximum velocity, m. p. h.	15.7	13.7	17.2	13.3	11.6	15.6	13.32	14.39
Absolute maximum, direction and velocity, m. p. h	N. 35, E. 35	N. 56	NE. 32	SE. 28	N. 38	NW. 29	N. 38	N. 56
Date	3, 4	22	2	25	28	30	-------	-------
Prevailing direction	SE.	SE.	SE.	SE.	SE.	NW.	SE.	-------

TABLE 38.—*Mean wind velocity with the different wind directions at Little America and Bolling Advance Base, by month, season, and year m. p. h.*

LITTLE AMERICA, 1929

	North	Northeast	East	Southeast	South	Southwest	West	Northwest
January 1929	9.4	10.2	8.7	9.6	10.7	10.1	7.3	4.8
February 1929	15.6	16.4	13.0	8.5	7.7	5.1	7.5	15.0
March 1929	12.0	12.6	16.1	14.4	7.5	11.0	9.2	-----
April 1929	7.7	7.9	13.9	5.9	5.8	6.4	9.0	-----
May 1929	9.9	8.3	13.0	5.0	6.0	6.5	7.3	-----
June 1929	11.8	12.1	12.0	9.0	7.1	5.6	3.6	5.2
July 1929	5.8	7.4	11.3	7.3	6.4	8.2	7.4	7.5
August 1929	12.2	14.7	12.7	14.8	7.6	5.8	5.4	6.7
September 1929	11.2	11.6	10.6	11.4	6.8	8.5	7.3	4.5
October 1929	5.2	9.7	16.9	8.8	7.6	6.9	5.5	-----
November 1929	9.2	7.8	11.0	7.4	7.3	6.8	8.2	12.2
December 1929	10.5	11.8	11.2	9.4	7.0	5.5	6.4	7.8
January 1930	10.0	8.3	12.2	11.0	7.7	7.7	6.8	5.0
Year, 1929	9.62	11.15	12.46	9.62	7.48	7.37	6.99	7.14

LITTLE AMERICA, 1934

February 1934	-----	-----	14.3	19.7	5.6	8.1	10.6	-----
March 1934	18.5	22.0	18.3	15.0	11.5	10.9	9.2	18.9
April 1934	19.5	19.9	19.9	13.1	6.4	6.0	9.1	-----
May 1934	18.2	18.0	14.5	16.2	7.7	6.8	4.3	2.5
June 1934	19.1	15.9	15.8	13.1	8.6	7.9	6.5	4.0
July 1934	17.8	13.1	14.7	26.7	7.2	8.4	6.1	13.4
August 1934	7.7	27.6	13.0	7.4	7.6	7.7	6.7	7.5
September 1934	16.1	13.8	17.6	10.2	7.5	12.1	6.2	7.0
October 1934	14.3	18.6	15.6	15.8	8.9	12.1	10.3	7.9
November 1934	16.6	10.3	15.1	12.7	7.2	8.2	8.5	11.2
December 1934	8.8	8.7	11.3	9.8	7.3	9.4	4.6	9.0
January 1935	13.9	11.8	12.9	12.4	10.9	10.3	6.9	10.5
Year, 1934	14.97	15.66	15.50	15.20	8.03	8.93	7.17	10.08

LITTLE AMERICA—COMBINED DATA, 1929 AND 1934

January	11.35	10.05	11.57	10.79	10.18	9.56	6.94	9.75
February	15.57	16.39	14.19	15.99	7.15	7.71	9.72	15.00
March	18.00	17.81	16.91	14.79	8.89	10.95	9.18	18.88
April	14.56	16.11	17.30	10.92	6.11	6.31	9.00	-----
May	13.50	14.39	13.69	14.42	7.14	6.57	6.52	2.50
June	13.82	13.39	13.46	12.43	7.92	7.23	5.83	4.78
July	10.71	8.82	12.70	18.84	6.75	8.29	6.46	9.38
August	10.53	17.12	12.83	10.86	7.57	6.78	6.33	7.35
September	14.96	13.16	14.55	11.03	7.07	9.84	6.50	6.63
October	12.50	14.25	13.93	12.78	8.07	9.11	7.65	7.90
November	13.73	9.00	12.63	10.62	7.23	7.57	8.34	11.31
December	9.79	9.49	11.25	9.28	7.12	6.92	5.46	8.38
Year	12.43	13.02	13.96	13.10	7.72	8.13	7.09	9.45

TABLE 38.—*Mean wind velocity with the different wind directions at Little America and Bolling Advance Base, by month, season, and year m. p. h.*—Continued

LITTLE AMERICA, 1929

	North	Northeast	East	Southeast	South	Southwest	West	Northwest
Summer	9.81	11.50	11.69	9.58	8.50	7.71	6.81	7.07
Autumn	9.26	10.12	14.59	8.18	6.29	7.22	8.19	-----
Winter	10.47	11.89	12.05	11.45	7.09	7.03	6.14	6.70
Spring	8.33	9.11	11.35	9.23	7.20	7.67	6.85	8.38
Light season	9.37	11.20	12.52	9.62	8.05	7.75	6.96	8.16
Dark season	10.07	11.07	12.39	9.62	6.66	7.15	7.01	6.33

LITTLE AMERICA, 1934

Summer	12.32	10.47	12.40	15.19	8.49	9.15	6.79	10.26
Autumn	18.72	20.04	17.65	14.94	8.20	8.69	8.44	17.06
Winter	15.77	17.49	14.66	16.17	7.66	8.04	6.43	8.24
Spring	15.43	14.21	16.02	13.63	7.72	11.11	7.61	8.79
Light season	14.12	13.87	14.64	14.92	8.59	9.96	8.39	11.32
Dark season	17.01	17.80	16.39	15.43	7.48	8.27	6.35	7.44

LITTLE AMERICA—COMBINED DATA—1929 AND 1934

Summer	10.89	11.16	11.94	12.36	8.49	8.30	6.80	9.48
Autumn	14.80	16.25	16.02	13.27	7.26	7.97	8.32	17.06
Winter	12.23	13.46	13.13	14.95	7.59	7.57	3.97	7.56
Spring	13.47	11.89	13.59	11.55	7.43	9.02	7.29	8.75
Light season	11.98	12.25	13.34	12.46	8.28	7.99	7.67	10.84
Dark season	13.36	14.08	14.32	13.81	7.03	7.68	6.59	7.08
Year	12.43	13.02	13.96	12.10	7.72	8.13	7.09	9.45

BOLLING ADVANCE BASE, 1934

April 1934	14.8	16.5	11.4	11.1	7.1	5.3	2.7	2.0
May 1934	11.4	7.1	7.0	8.4	8.4	5.4	4.4	4.0
June 1934	10.0	9.5	9.1	11.2	7.3	8.4	5.5	5.9
July 1934	9.4	2.3	3.2	11.3	8.5	4.9	4.8	6.7
August 1934	6.6	6.5	6.1	7.2	5.9	5.6	4.6	7.6
September 1934	10.1	6.4	10.3	8.1	6.2	10.8	6.7	10.6
Winter, 1934	8.02	7.37	7.40	10.52	7.51	6.15	5.02	6.86
Dark season, 1934	9.50	7.89	9.13	9.98	7.34	5.87	5.45	7.56

TABLE 39.—*Percentage frequency and percentage movement for the different wind directions at Little America and Bolling Advance Base, by month, season, and year*

LITTLE AMERICA, 1929

	Wind from—																Calm	
	North		Northeast		East		Southeast		South		Southwest		West		Northwest			
	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency
January 1929	4.9	5.2	10.9	10.7	18.4	21.2	10.4	10.8	32.2	29.9	16.6	16.3	3.9	5.3	0.3	0.6	-----	-----
February 1929	1.5	1.1	14.4	9.9	54.9	47.6	7.5	9.9	18.8	27.6	.6	1.4	1.2	1.8	.2	.1	-----	0.6
March 1929	.3	.3	4.8	4.9	66.2	53.9	3.9	3.6	14.0	24.6	6.9	8.3	2.8	4.0	-----	-----	-----	.4
April 1929	2.3	2.5	2.9	3.1	52.4	31.8	3.7	5.3	17.5	25.3	15.5	20.3	5.6	5.3	-----	-----	-----	6.5
May 1929	5.0	4.4	2.9	3.1	55.0	37.1	1.8	3.1	14.0	20.3	14.2	19.2	7.1	8.6	-----	-----	-----	4.2
June 1929	7.6	6.8	12.5	10.4	61.9	51.9	2.7	3.1	7.9	11.3	6.5	11.7	.4	1.0	.4	.8	-----	3.2
July 1929	2.0	2.7	4.3	4.6	23.7	16.5	6.7	5.4	18.1	22.3	37.3	35.9	6.6	7.0	1.4	1.5	-----	4.2
August 1929	3.5	2.6	10.7	6.5	32.7	23.0	8.1	4.8	26.5	31.2	13.2	20.4	5.0	8.2	.3	.4	-----	2.9
September 1929	2.3	1.7	1.7	1.3	27.8	21.7	7.3	5.3	25.8	31.1	28.4	27.5	6.4	7.2	.3	.5	-----	3.7
October 1929	1.7	2.8	3.1	2.8	50.9	38.0	5.3	5.5	21.7	26.1	11.9	15.6	5.4	9.0	-----	-----	-----	.1
November 1929	5.1	5.1	3.1	3.6	56.7	47.2	4.2	5.1	15.0	18.9	8.6	11.7	6.5	7.4	.7	.6	-----	.4
December 1929	12.2	10.1	3.7	2.7	40.7	31.3	10.2	9.0	17.1	21.4	9.8	15.5	5.3	7.2	1.0	1.1	-----	1.7
January 1930	10.1	11.2	7.6	8.8	49.5	39.5	7.6	6.9	10.7	13.5	6.6	8.3	7.8	11.2	.1	.3	-----	.3
Year, 1929	4.40	4.33	6.53	5.55	46.52	35.33	6.06	5.96	18.41	23.29	12.79	16.43	4.77	6.47	.34	.45	-----	2.19

LITTLE AMERICA, 1934

February 1934	-----	-----	-----	-----	26.0	23.5	48.6	31.9	7.4	17.2	11.8	19.1	6.2	7.6	-----	-----	-----	0.7
March 1934	4.3	3.4	9.1	5.9	38.0	29.7	7.8	7.4	10.3	12.7	18.2	23.8	9.4	14.6	2.9	2.2	-----	.3
April 1934	4.7	3.5	9.2	6.7	59.4	42.8	10.9	11.9	10.9	24.4	3.6	8.6	1.3	2.1	-----	-----	-----	-----
May 1934	5.1	3.4	7.8	5.3	40.9	34.2	22.2	16.5	14.1	20.7	8.7	15.7	1.1	3.0	.1	.3	-----	.9
June 1934	4.0	2.5	7.2	5.4	42.8	32.5	17.0	15.6	9.1	12.6	17.8	26.9	2.0	3.8	.1	.4	-----	.3
July 1934	3.0	1.9	1.8	1.5	15.3	11.4	34.0	17.2	11.8	18.1	22.2	28.9	11.2	20.0	.7	.7	-----	.3
August 1934	1.3	1.5	4.7	1.5	31.7	21.4	4.6	5.5	19.7	22.8	20.4	23.2	15.7	20.6	1.9	2.3	-----	1.2
September 1934	7.9	5.7	3.7	3.0	43.0	28.2	2.5	2.8	13.5	21.0	17.4	16.7	10.1	18.7	1.9	3.2	-----	.7
October 1934	12.2	11.4	4.1	3.0	46.7	39.9	8.4	7.1	11.0	16.5	10.3	11.3	5.7	7.4	1.6	2.7	-----	.7
November 1934	11.9	8.1	2.9	3.2	40.9	30.3	8.8	7.8	16.2	25.4	10.9	14.9	4.9	6.4	3.5	3.5	-----	.4
December 1934	6.0	6.2	5.8	5.9	42.3	33.4	8.9	9.0	22.4	27.4	9.7	9.1	3.8	7.4	1.1	1.1	-----	.5
January 1935	16.7	14.1	9.1	9.1	27.9	25.4	8.5	8.1	22.8	24.5	7.4	8.5	3.0	5.1	4.6	5.1	-----	.1
Year, 1934	6.76	5.33	5.81	4.38	38.88	29.59	14.12	10.96	13.89	20.40	12.99	17.16	5.97	9.83	1.58	1.85	-----	.52

LITTLE AMERICA, COMBINED DATA, 1929 AND 1934

January	10.96	10.14	9.23	9.64	31.77	28.82	8.79	8.54	21.87	22.54	9.98	10.95	4.78	7.23	1.86	2.00	-----	0.14
February	0.85	0.65	8.46	6.16	42.91	38.43	24.51	18.28	14.09	23.51	5.25	8.12	3.27	4.01	0.17	.09	-----	.75
March	2.41	1.84	7.06	5.44	51.37	41.67	5.93	5.50	12.07	18.63	12.85	16.11	6.28	9.38	1.50	1.09	-----	.34
April	3.82	2.99	6.89	4.86	57.09	37.29	8.27	8.61	13.35	24.86	8.01	14.44	2.91	3.68	-----	-----	-----	3.26
May	5.05	3.90	5.75	4.17	46.89	35.69	13.58	9.81	14.04	20.50	11.02	17.47	3.62	5.78	.03	.13	-----	2.55
June	5.65	4.51	9.61	7.92	51.49	42.22	10.48	9.31	8.57	11.94	12.65	19.31	1.28	2.43	.27	.62	-----	1.74
July	2.59	2.28	2.83	3.02	18.80	13.98	22.53	11.29	14.47	20.23	28.45	32.39	9.25	13.51	1.07	1.08	-----	2.22
August	2.40	2.02	7.68	3.97	32.21	22.18	6.36	5.17	23.51	27.02	16.77	21.84	10.31	14.38	1.12	1.34	-----	2.08
September	5.57	3.68	2.86	2.15	36.69	24.93	4.49	4.03	18.62	26.04	21.98	22.08	8.53	12.99	1.26	1.88	-----	2.22
October	7.94	7.12	3.67	2.89	48.41	38.98	7.20	6.32	15.33	21.30	10.92	13.44	5.59	8.20	.95	1.34	-----	.40
November	8.87	6.60	3.00	3.40	48.04	38.82	6.72	6.46	15.68	22.15	9.83	13.26	5.62	6.88	2.23	2.01	-----	.42
December	9.08	8.13	4.73	4.37	41.50	32.33	9.61	9.07	19.78	24.33	9.71	12.30	4.56	7.32	1.03	1.08	-----	1.14
Year	5.65	4.80	6.15	4.99	42.48	32.61	10.32	8.33	16.02	21.92	12.90	16.78	5.41	8.06	1.00	1.11	-----	1.40

LITTLE AMERICA, 1929

Summer	6.94	6.98	9.36	8.03	41.11	34.71	8.88	9.15	19.69	22.87	8.24	10.55	4.51	6.53	0.38	0.52	-----	0.66
Autumn	2.22	2.42	3.70	3.70	59.13	40.94	3.22	3.97	14.53	23.36	11.39	15.93	4.85	5.98	-----	-----	-----	3.70
Winter	4.56	3.89	9.45	7.11	40.77	30.25	5.68	4.44	17.20	21.69	17.90	22.78	3.76	5.48	.68	.91	-----	3.44
Spring	3.02	3.21	2.64	2.56	45.83	35.67	5.55	5.31	20.66	25.37	15.83	18.22	6.11	7.88	.35	.37	-----	1.42
Light season	4.76	5.14	6.85	6.20	49.12	39.74	6.88	7.24	18.31	23.03	8.51	11.12	4.57	6.65	.30	.37	-----	.51
Dark season	3.92	3.39	6.11	4.80	43.03	30.26	4.95	4.49	18.03	23.59	18.51	22.54	5.04	6.26	.40	.55	-----	4.12

LITTLE AMERICA, 1934

Summer	9.01	7.96	5.73	5.96	32.02	28.11	18.91	13.55	18.71	24.00	9.26	11.02	4.08	6.54	2.29	2.43	-----	0.47
Autumn	4.69	3.40	8.77	5.93	46.24	35.51	13.18	11.96	11.64	19.25	10.34	16.12	4.12	6.61	1.03	.82	-----	.41
Winter	2.92	1.95	4.59	2.76	30.15	21.65	19.56	12.73	13.10	17.93	20.13	26.36	9.10	14.90	.89	1.13	-----	.59
Spring	10.78	8.42	3.62	3.07	43.75	32.92	6.68	5.91	13.39	20.92	12.70	14.24	6.82	10.81	2.27	3.11	-----	.60
Light season	9.13	7.77	5.68	4.92	37.72	30.95	12.74	10.26	14.92	20.86	11.66	14.06	5.68	8.14	2.46	2.61	-----	.46
Dark season	4.47	3.05	5.94	3.87	40.00	28.32	15.44	11.61	12.87	19.97	14.29	20.06	6.24	11.41	.73	1.14	-----	.57

TABLE 39.—*Percentage frequency and percentage movement for the different wind directions at Little America and Bolling Advance Base, by month, season, and year*—Continued

LITTLE AMERICA—COMBINED DATA, 1929 AND 1934

	Wind from—																Calm	
	North		Northeast		East		Southeast		South		Southwest		West		Northwest			
	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency	Percent movement	Percent frequency
Summer	7.82	7.37	7.83	7.20	37.28	2.08	13.12	10.90	19.28	23.32	8.67	10.74	4.33	6.53	1.18	1.28	-----	0.59
Autumn	3.64	2.91	6.62	4.82	51.72	38.21	8.94	7.98	13.06	21.30	10.78	16.03	4.43	6.30	.59	.41	-----	2.04
Winter	3.66	2.92	6.81	4.94	34.95	25.95	13.15	8.58	15.41	19.81	19.06	24.57	6.63	10.19	.79	1.02	-----	2.02
Spring	7.50	5.82	3.20	2.82	44.63	34.29	6.20	5.61	16.47	23.15	14.02	16.23	6.52	9.34	1.46	1.74	-----	1.01
Light season	6.90	6.32	6.28	5.62	43.53	35.80	9.76	8.59	16.65	22.05	9.06	12.44	5.12	7.31	1.36	1.38	-----	.49
Dark season	4.24	3.22	6.01	4.34	41.30	29.29	10.95	8.05	15.08	21.78	16.10	21.30	5.73	8.83	.59	.84	-----	2.35
BOLLING ADVANCE BASE, 1934																		
April	2.9	1.9	7.3	4.2	30.1	25.1	30.9	26.3	26.8	36.1	1.5	2.6	0.3	1.3	0.2	0.9	-----	1.6
May	7.9	5.0	9.7	9.8	13.6	13.8	37.3	31.7	16.4	14.0	8.3	11.0	2.6	4.2	4.3	7.7	-----	2.8
June	2.5	2.2	10.0	9.3	10.3	10.0	43.8	34.6	11.4	13.8	12.3	13.1	3.4	5.6	6.3	9.4	-----	2.1
July	6.9	5.8	.4	1.6	.5	1.3	40.8	28.9	21.8	20.4	10.7	17.5	2.4	3.9	16.5	19.6	-----	1.0
August	8.8	8.6	13.5	13.4	8.2	8.6	22.2	19.8	14.2	15.7	10.6	12.3	3.4	4.7	19.2	16.3	-----	.5
September	12.8	10.3	7.9	10.0	12.0	9.5	11.7	11.7	9.4	12.4	8.0	12.0	9.0	10.9	29.1	22.3	-----	.8
Winter	5.76	5.63	7.67	8.15	6.32	6.69	36.74	27.39	15.76	16.44	11.29	14.38	3.05	4.76	13.43	15.35	-----	1.19
Dark season	6.72	5.69	7.95	8.09	12.85	11.31	31.57	25.41	16.90	18.50	8.42	11.54	3.45	5.09	12.13	12.90	-----	1.48

TABLE 40.—*Resultant values of the direction and velocity of the surface wind at Little America and Bolling Advance Base, by month, season, and year*

LITTLE AMERICA—1929

Period	N-S, component (m. p. h.)	E-W, component (m. p. h.)	Mean direction from—	Resultant direction from—	Mean velocity (m. p. h.)	Resultant velocity (m. p. h.)	Stability (percent)
January 1929	−3.67	−1.69	S. 28° E.	S. 24.7° E.	9.54	4.04	42
February 1929	−1.42	−7.64	S. 65° E.	S. 79.5° E.	11.14	11.14	70
March 1929	−2.32	−8.31	S. 60° E.	S. 74.4° E.	12.86	8.62	67
April 1929	−2.25	−3.40	S. 25° E.	S. 56.5° E.	8.40	4.08	49
May 1929	−1.59	−3.60	S. 33° E.	S. 66.2° E.	8.77	3.94	45
June 1929	.24	−6.79	S. 82° E.	N. 88.0° E.	10.08	6.80	67
July 1929	−3.41	.19	S. 12° W.	S. 3.2° W.	7.90	3.41	43
August 1929	−2.69	−2.79	S. 11° E.	S. 46.1° E.	8.89	3.88	44
September 1929	−3.85	−.67	S. 1° W.	S. 9.8° E	8.23	3.91	47
October 1929	−2.74	−3.90	S. 33° E.	S. 55.0° E.	9.07	4.79	53
November 1929	−1.49	−4.48	S. 59° E.	S. 71.6° E.	9.19	4.72	51
December 1929	−1.37	−3.25	S. 39° E.	S. 67.2° E.	8.65	3.53	41
January 1930	−.50	−4.65	S. 86° E.	S. 83.8° E.	9.74	4.68	48
LITTLE AMERICA—1929 AND 1934, COMBINED DATA							
January	−1.69	−3.24	S. 55° E.	S. 62.6° E.	10.34	3.66	36
February	−3.34	−7.01	S. 51° E.	S. 64.5° E.	11.84	7.76	66
March	−2.29	−5.99	S. 45° E.	S. 69.0° E.	13.60	6.40	47
April	−1.85	−6.70	S. 43° E.	S. 74.5° E.	11.37	6.94	61
May	−2.32	−5.12	S. 40° E.	S. 65.6° E.	10.42	5.62	54
June	−1.36	−6.10	S. 60° E.	S. 77.4° E.	11.04	6.29	57
July	−4.27	−.62	S. 16° W.	S. 8.3° E.	9.43	4.31	51
August	−2.82	−1.75	S. 3° W.	S. 31.9° E.	8.84	3.32	38
September	−2.83	−1.70	S. 1° W.	S. 30.9° E.	9.86	3.30	33
October	−1.95	−4.85	S. 47° E.	S. 68.1° E.	11.22	5.23	45
November	−1.51	−4.16	S. 48° E.	S. 70.0° E.	10.21	4.43	43
December	−1.78	−3.48	S. 42° E.	S. 62.8° E.	8.76	3.89	44

TABLE 40.—*Resultant values of the direction and velocity of the surface wind at Little America and Bolling Advance Base, by month, season, and year*—Continued

Period	N-S, component (m.p.h.)	E-W, component (m.p.h.)	Mean direction from—	Resultant direction from—	Mean velocity (m.p.h.)	Resultant velocity (m.p.h.)	Stability (percent)
LITTLE AMERICA—1934							
February 1934	−6.51	−5.95	S. 25° E.	S. 42.4° E.	12.98	8.82	68
March 1934	−2.26	−3.66	S. 13° E.	S. 58.3° E.	14.28	4.30	30
April 1934	−1.44	−9.99	S. 58° E.	S. 81.8° E.	14.34	10.09	70
May 1934	−3.05	−6.64	S. 44° E.	S. 65.3° E.	12.07	7.30	60
June 1934	−2.95	−5.41	S. 34° E.	S. 61.4° E.	11.99	6.16	51
July 1934	−5.12	−1.44	S. 19° W.	S. 15.7° E.	10.98	5.31	48
August 1934	−2.76	−.66	S. 17° W.	S. 12.2° E.	8.79	2.86	32
September 1934	−1.81	−2.73	S. 1° W.	S. 56.3° E.	11.55	3.28	28
October 1934	−1.06	−5.55	S. 65° E.	S. 79.2° E.	13.36	5.64	42
November 1934	−1.53	−3.84	S. 33° E.	S. 68.3° E.	11.22	4.13	37
December 1934	−2.19	−3.67	S. 45° E.	S. 59.2° E.	8.88	4.27	48
January 1935	−.89	−3.39	S. 62° E.	S. 75.8° E.	11.75	3.51	30
LITTLE AMERICA—1929							
Summer 1929	−1.75	−4.23	S. 54° E.	S. 67.6° E.	9.73	4.58	47
Fall 1929	−1.96	−4.91	S. 41° E.	S. 68.2° E.	10.00	5.28	53
Winter 1929	−1.98	−3.10	S. 27° E.	S. 57.4° E.	8.94	3.68	41
Spring 1929	−2.55	−3.17	S. 29° E.	S. 51.3° E.	8.83	4.07	46
LITTLE AMERICA—1934							
Summer 1934	−2.61	−4.05	S. 43° E.	S. 57.3° E.	10.89	4.82	44
Fall 1934	−2.26	−6.73	S. 44° E.	S. 71.6° E.	13.56	7.10	52
Winter 1934	−3.62	−2.45	S. 2° W.	S. 34.1° E.	10.57	4.37	41
Spring 1934	−1.46	−4.06	S. 37° E.	S. 70.1° E.	12.06	4.32	36
LITTLE AMERICA—1929 AND 1934, COMBINED DATA							
Summer	−2.09	−4.16	S. 50° E.	S. 63.4° E.	10.19	4.66	46
Fall	−2.16	−5.92	S. 43° E.	S. 70.0° E.	11.79	6.31	53
Winter	−2.80	−2.77	S. 11° E.	S. 44.6° E.	9.76	3.94	40
Spring	−1.92	−3.62	S. 32° E.	S. 61.0° E.	10.45	4.10	39
LITTLE AMERICA, 1929							
Light season 1929	−1.94	−4.81	S. 53° E.	S. 68.0° E.	10.01	5.18	52
Dark season 1929	−2.19	−2.91	S. 22° E.	S. 53.0° E.	8.71	3.64	42
LITTLE AMERICA, 1934							
Light season 1934	−2.84	−3.86	S. 41° E.	S. 53.6° E.	12.01	4.79	40
Dark season 1934	−2.87	−4.44	S. 20° E.	S. 57.1° E.	11.60	5.29	46
LITTLE AMERICA, 1929 AND 1934, COMBINED DATA							
Light season	−2.34	−4.39	S. 48° E.	S. 61.9° E.	10.90	4.97	46
Dark season	−2.56	−3.67	S. 21° E.	S. 55.4° E.	10.16	4.48	44
LITTLE AMERICA							
Year 1929	−2.06	−3.93	S. 38° E.	S. 62.4° E.	9.41	4.43	47
Year 1934	−2.86	−4.16	S. 30° E.	S. 55.5° E.	11.80	5.02	43
Year 1929 and 1934, combined data	−2.42	−4.04	S. 35° E.	S. 58.9° E.	10.54	4.71	45
BOLLING ADVANCE BASE, 1934							
April 1934	−3.94	−5.27	S. 40° E.	S. 53.3° E.	9.49	6.58	69
May 1934	−2.22	−2.53	S. 44° E.	S. 48.8° E.	7.17	3.37	47
June 1934	−3.30	−2.81	S. 31° E.	S. 40.5° E.	8.88	4.34	49
July 1934	−3.14	−.65	S. 13° W.	S. 11.7° E.	8.03	3.20	40
August 1934	−.36	−.58	S. 39° E.	S. 58.7° E.	6.61	.68	10
September 1934	+1.27	+.76	N. 70° W.	N. 30.8° W.	8.13	1.48	18
Winter 1934	−2.29	−1.35	S. 14° E.	S. 30.6° E.	7.84	2.66	34
Dark season 1934	−1.95	−1.83	S. 28° E.	S. 43.2° E.	8.04	2.68	33

TABLE 41.—*Mean maximum velocity and percentage frequency with the different directions at Little America, by seasons*

Direction	North	Northeast	East	Southeast	South	Southwest	West	Northwest
SUMMER 1929								
Mean maximum velocity, m. p. h.	14.31	18.82	17.26	19.42	15.50	15.38	11.25	----------
Percent frequency	10.08	8.53	38.75	9.30	20.16	10.08	3.10	----------
AUTUMN 1929								
Mean maximum velocity, m. p. h.	15.75	30.00	23.26	17.36	16.86	14.65	16.38	----------
Percent frequency	4.40	1.10	47.25	12.09	7.69	18.68	8.79	----------
WINTER 1929								
Mean maximum velocity, m. p. h.	22.50	28.67	21.51	26.20	12.93	13.91	12.33	13.00
Percent frequency	4.35	6.52	38.05	5.43	16.30	25.00	3.26	1.09
SPRING 1929								
Mean maximum velocity, m. p. h.	24.00	13.00	17.42	16.00	14.65	15.33	13.00	15.00
Percent frequency	2.20	1.10	52.75	1.10	25.27	9.89	5.49	2.20
YEAR 1929								
Mean maximum velocity, m. p. h.	16.83	22.21	19.61	19.69	14.82	14.63	13.90	14.33
Percent frequency	5.71	4.71	43.68	7.20	17.62	15.38	4.96	.74
SUMMER SEASON 1934								
Mean maximum velocity, m. p. h.	21.00	14.80	18.78	25.36	15.18	20.71	16.67	19.00
Percent frequency	6.33	6.33	34.17	17.72	21.51	8.87	3.80	1.27
AUTUMN 1934								
Mean maximum velocity, m. p. h.	25.50	32.00	27.47	28.00	20.00	18.89	15.33	26.00
Percent frequency	2.17	6.52	57.61	11.96	7.61	9.78	3.26	1.09
WINTER 1934								
Mean maximum velocity, m. p. h.	24.00	----------	22.59	29.32	22.71	16.69	16.33	----------
Percent frequency	4.35	----------	29.35	20.65	7.61	31.52	6.52	----------
SPRING 1934								
Mean maximum velocity, m. p. h.	24.00	24.00	25.42	49.00	18.00	19.67	14.00	17.33
Percent frequency	9.89	2.20	43.96	1.10	16.48	16.48	6.59	3.30
YEAR 1934								
Mean maximum velocity, m. p. h.	23.40	24.15	24.42	28.20	17.98	18.23	15.44	19.40
Percent frequency	5.65	3.67	41.54	12.71	12.99	16.95	5.08	1.41
COMBINED DATA, 1929 AND 1934								
SUMMER								
Mean maximum velocity, m. p. h.	16.17	17.56	17.79	22.62	15.37	17.25	13.57	19.00
Percent frequency	8.65	7.69	37.02	12.50	20.67	9.62	3.37	.48
AUTUMN								
Mean maximum velocity, m. p. h.	19.00	31.71	25.58	22.68	18.43	16.12	16.09	26.00
Percent frequency	3.28	3.83	52.45	12.02	7.65	14.21	6.01	.55
WINTER								
Mean maximum velocity, m. p. h.	23.55	28.67	21.98	28.67	16.05	15.46	15.00	13.00
Percent frequency	4.35	3.26	33.70	13.04	11.96	28.26	4.89	.54
SPRING								
Mean maximum velocity, m. p. h.	24.00	20.33	21.06	32.50	15.89	18.04	13.55	16.40
Percent frequency	6.04	1.65	48.35	1.10	20.88	13.19	6.04	2.75
YEAR								
Mean maximum velocity, m. p. h.	19.88	23.00	21.80	24.86	16.06	16.40	14.63	17.50
Percent frequency	5.68	4.23	42.66	9.78	15.46	16.11	5.02	1.06

TABLE 41A.—*Number of days in each month with light and strong winds at Little America and Bolling Advance Base*

LITTLE AMERICA

	Year	January	February	March	April	May	June	July	August	September	October	November	December	January
Number of days with—														
Maximum velocity for day ≧ 30 m. p. h.	1929	2	4	8	1	1	4	4	3	2	0	0	0	[1] 0
Maximum velocity for day ≧ 30 m. p. h.	1934	------	------	15	11	8	8	5	4	7	5	4	1	[2] 0
Mean daily wind velocity ≧ 20.0 m. p. h.	1929	0	1	4	0	1	1	1	3	0	0	0	0	[1] 0
Mean daily wind velocity ≧ 20.0 m. p. h.	1934	------	------	6	7	1	2	2	2	3	5	2	0	[2] 1
Mean daily wind velocity ≦ 5.0 m. p. h.	1929	1	1	2	5	4	5	12	9	8	4	0	4	[1] 0
Mean daily wind velocity ≦ 5.0 m. p. h.	1934	------	------	1	2	2	2	4	6	2	2	0	3	[2] 1

BOLLING ADVANCE BASE

	Year	April	May	June	July	August	September
Number of days with—							
Maximum velocity for day ≧ 30 m. p. h.	1934	2	2	1	0	1	0
Mean daily wind velocity ≧ 20.0 m. p. h.	1934	2	1	0	0	0	0
Mean daily wind velocity ≦ 5.0 m. p. h.	1934	5	16	4	12	9	5

[1] January 1930. [2] January 1935.

TABLE 42.—*Percentage frequencies of cases with wind velocities between stated limits at Little America and Bolling Advance Base, by seasons*

LITTLE AMERICA, 1929

[Stated limits, m. p. h.]

Season	0-2	3-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	≧60
Summer	3.44	11.41	41.08	24.65	15.75	3.15	0.39	0.13	------	------	------	------	------	------
Autumn	9.15	12.68	34.55	19.97	15.04	5.39	2.40	.36	0.41	0.05	------	------	------	------
Winter	12.00	19.02	32.97	15.81	11.96	5.25	1.81	.68	.41	.09	------	------	------	------
Spring	5.72	15.34	41.13	23.67	11.81	1.92	.27	.09	.05	------	------	------	------	------
Year	7.20	14.31	37.76	21.36	13.84	3.86	1.14	.30	.20	.03	------	------	------	------

LITTLE AMERICA, 1934

Summer	3.90	12.87	31.23	23.47	19.46	6.70	2.16	0.21	------	------	------	------	------	------
Autumn	2.81	8.74	30.02	15.58	19.02	12.05	7.43	3.17	.91	0.27	------	------	------	------
Winter	5.84	15.94	33.48	19.47	13.90	6.39	2.26	1.31	.54	.41	0.41	0.05	------	------
Spring	3.89	11.45	30.48	20.24	17.54	9.34	3.85	1.74	.92	.55	------	------	------	------
Year	4.12	12.23	31.31	19.55	17.41	8.69	3.99	1.66	.61	.32	.10	.01	------	------

LITTLE AMERICA, COMBINED DATA, 1929 AND 1934

Summer	3.61	11.96	37.35	24.21	17.16	4.49	1.06	0.16	------	------	------	------	------	------
Autumn	5.98	10.71	32.28	17.78	17.03	8.72	4.91	1.77	0.66	0.16	------	------	------	------
Winter	8.92	17.48	33.22	17.64	12.93	5.82	2.04	1.00	.48	.25	.20	0.02	------	------
Spring	4.81	13.39	35.81	21.96	14.67	5.63	2.06	.92	.48	.27	------	------	------	------
Year	5.76	13.34	34.76	20.51	15.51	6.11	2.47	.93	.39	.16	.05	.01	------	------

BOLLING ADVANCE BASE, 1934

Winter	8.29	19.93	41.59	18.92	9.34	1.15	0.69	0.09	------	------	------	------	------	------

6. CLOUDS

The results of the cloud observations are given in tables 43 to 52. In table 47 is given the total number of observations of the different cloud types made three times daily as a part of the regular daily surface observations. Percentage frequencies based on these numbers are given in table 48. The number of fogs includes light as well as dense fog. Stratus is by far the most frequent cloud form, except in summer when the StCu form occurs with about the same frequency. Cumulus occurs occasionally in the summer when there is strong convection over the open water to the north. The mean direction of the different cloud forms, based on the regular daily cloud observations mentioned in connection with table 47, is given in table 49.

In table 50 are given the altitudes of the different cloud forms as determined from individual pilot-balloon ascents; mean values are entered in table 51. Since, in the Antarctic, the *mean* direction of cloud motion has frequently been used to represent the average wind direction at upper levels, table 52 has been constructed to show how the mean direction of cloud motion as computed from the eye observations differs from the mean and resultant directions computed from the pilot-balloon ascents, that is, from the average wind direction at these levels.

TABLE 43.—*Mean cloudiness by months and seasons at Little America*

	January 1929	February 1929	March 1929	April 1929	May 1929	June 1929	July 1929	August 1929	September 1929	October 1929	November 1929	December 1929	January 1930	February 1930	Mean 1929
Mean	7.4	7.5	8.2	5.7	6.0	6.4	3.5	5.7	4.4	6.4	5.4	6.4	7.1	[1]6.1	5.95
			March 1934	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934	January 1935		Mean 1934
Mean			6.8	7.7	5.5	5.7	4.2	4.7	5.7	7.1	6.3	5.9	7.7		5.95
Combined data	7.3	6.7	7.5	6.4	5.8	6.1	3.9	5.3	4.8	6.6	5.7	6.2			5.95

Year	Summer	Fall	Winter	Spring	Light season	Dark season
1929	6.9	6.4	5.2	5.4	6.7	5.3
1934	6.8	6.6	4.9	6.4	6.8	5.4
Combined data	6.8	6.5	5.1	5.7	6.7	5.3

[1] Mean for first 8 days and 21 hours of February 1930.

TABLE 44.—*Mean cloudiness with different wind directions at Little America*

	Wind direction from—							
	North	Northeast	East	Southeast	South	Southwest	West	Northwest
Season:								
Summer 1929	9.4	9.6	7.6	6.6	5.8	4.6	5.2	6.2
Autumn 1929	7.4	7.8	8.3	5.7	5.2	3.9	5.8	
Winter 1929	7.0	6.6	8.8	6.2	4.2	2.9	4.3	6.1
Spring 1929	8.9	7.4	6.7	5.7	4.2	4.5	3.8	8.0
Year 1929	8.5	8.0	7.8	6.2	4.8	3.8	4.7	6.5
Summer 1934	9.8	8.6	7.5	7.2	4.5	5.0	7.7	9.0
Autumn 1934	9.2	7.9	7.5	6.6	6.8	4.4	4.5	9.1
Winter 1934	7.5	8.1	7.0	7.9	4.4	2.7	2.2	6.5
Spring 1934	9.0	9.1	7.9	7.3	4.3	5.4	3.6	7.6
Year 1934	9.1	8.3	7.4	7.4	4.9	3.7	3.3	7.9
Combined data, 1929 and 1934:								
Summer	9.5	9.4	7.6	6.8	5.4	4.7	5.6	8.1
Autumn	8.2	7.8	8.0	6.3	5.8	4.1	5.3	9.1
Winter	7.2	7.0	8.1	7.5	4.3	2.8	2.9	6.3
Spring	8.9	8.0	7.1	6.4	4.2	4.8	3.7	7.6
Years	8.7	8.1	7.7	6.9	4.9	3.8	4.1	7.5

TABLE 45.—*Number of days in each month with mean daily cloudiness within stated limits at Little America*

Mean Daily Cloudiness	Year	Month												
		January	February	March	April	May	June	July	August	September	October	November	December	January
>8.0	1929	16	16	19	6	12	11	3	7	5	11	9	13	[1] 17
>8.0	1934			14	21	13	10	7	5	10	16	15	16	[2] 22
<2.0	1929	4	3	1	6	6	4	13	5	9	2	7	4	[1] 4
<2.0	1934			3	4	8	6	13	9	6	4	6	10	[2] 4
<2.0 but >8.0	1929	11	8	10	15	12	15	15	17	15	18	13	12	[1] 10
	1934			14	5	10	12	11	17	14	9	9	5	[2] 5
≤10.0	1929	0	4	3	2	3	0	0	2	1	5	2	2	[1] 2
≤10.0	1934			5	6	9	2	2	2	4	10	6	9	[2] 13
Few or ≤0.1	1929	1	1	0	1	1	1	3	2	1	0	4	1	[1] 1
Few or ≤0.1	1934			1	2	5	3	4	6	4	2	3	5	[2] 3
≥8.0	1929	16	17	20	9	13	11	3	9	6	11	9	14	[1] 17
≥8.0	1934			14	21	13	12	7	5	10	17	15	16	[2] 22
≥3.0	1929	5	3	1	7	7	6	16	6	12	2	8	5	[1] 5
≥3.0	1934			3	4	12	6	14	11	8	5	7	12	[2] 4
3.0 but ≥8.0	1929	10	8	10	14	11	13	12	16	12	18	13	12	[1] 9
	1934			14	5	6	12	10	15	12	9	8	3	[2] 5

[1] For 1930.
[2] For 1935.

TABLE 46.—*Percentage frequency of cases with mean cloudiness within stated limits at Little America by months, combined data, 1929 and 1934*

		January 1929, 1930, 1935	February 1929, 1930	March 1929, 1934	April 1929, 1934	May 1929, 1934	June 1929, 1934	July 1929, 1934	August 1929, 1934	September 1929, 1934	October 1929, 1934	November 1929, 1934	December 1929, 1934
Mean cloudiness.	≤3.0	8.2	2.9	2.3	6.4	11.1	7.0	17.6	9.9	11.8	4.1	8.8	9.9
Do	>3.0 but ≤7.0	8.4	3.9	7.9	6.9	6.9	9.9	9.4	12.7	9.4	10.3	7.9	6.4
Do	>7.0 but ≤10.0	16.8	6.5	11.5	9.5	7.9	7.6	3.5	5.2	5.7	9.2	7.9	8.7

TABLE 47.—*Number of observations of the different cloud forms at Little America by seasons and year, combined data, 1929 and 1934*

	Cloud form									
	Fog	St.	Nb.	Cu.	St. Cu.	A. Cu.	A. St.	Cl. Cu.	Cl. St.	Cl.
Spring	40	134	2	4	77	25	72	1	47	48
Summer	43	186	18	13	195	103	99	12	45	72
Autumn	34	144	2	0	56	23	64	1	38	44
Winter	22	93	0	0	24	3	43	0	4	4
Year	139	557	22	17	352	154	278	14	134	168

TABLE 48.—*Percentage frequency of the different cloud forms at Little America by seasons and year, combined data, 1929 and 1934*

	Cloud form									
	Fog	St.	Nb.	Cu.	St. Cu.	A. Cu.	A. St.	Cl. Cu.	Cl. St.	Cl.
Summer	0.3	26.0	2.0	1.0	26.8	12.6	13.9	1.0	6.5	9.9
Autumn	.6	45.9	.6	.0	10.0	5.7	14.5	.3	11.3	11.1
Winter	.0	48.1	.0	.0	7.2	1.2	18.8	.0	12.9	11.8
Spring	.0	37.7	.5	.1	15.1	4.8	15.9	.3	12.6	13.2
Light season	.2	30.7	1.5	.9	21.9	10.1	14.8	.7	8.0	11.2
Dark season	.2	47.9	.2	.0	8.4	2.2	16.4	.0	13.4	11.3
Year	.2	37.5	1.0	.6	16.5	6.9	15.4	.4	10.3	11.2

TABLE 49.—*Mean direction of the different cloud forms at Little America by seasons and year, combined data, 1929 and 1934, direction from—*

	Cloud form									
	Cl.	Cl. St.	Cl. Cu.	A. Cu.	A. St.	St. Cu.	Cu.	St.	Nb.	Fog
Summer	*72* N. 40 W.	*45* N. 18 W.	*12* N. 2 E.	*103* N. 15 W.	*99* N. 88 E.	*195* N. 57 W.	*13* N. 2 E.	*186* N. 64 E.	*18* N. 39 W.	*43* S. 52 E.
Autumn	*44* N. 26 W.	*38* N. 4 E.	*1* N. 45 W.	*23* S. 89 W.	*64* N. 6 E.	*56* N. 45 W.	----------	*144* N. 52 E.	*2* S	*34* S. 25 E.
Winter	*4* N. 22 W.	*4* N. 12 W.	----------	*3* E.	*43* N. 25 E.	*24* N. 79 E.	----------	*93* N. 56 E.	----------	*22* S. 22 W.
Spring	*48* N. 15 W.	*47* N. 2 E.	*1* S. 24 E.	*25* S. 72 W.	*72* S. 76 E.	*77* N. 18 W.	*4* S. 63 E.	*134* N. 24 E.	*2* N.	*40* S. 39 E.
Year	*168* N. 32 W.	*134* N. 7 W.	*14* N. 5 W.	*154* N. 37 W.	*278* N. 58 E.	*352* N. 20 W.	*17* N. 7 E.	*557* N. 50 E.	*22* N. 37 W.	*139* S. 30 E.

The figures in italics in the upper left-hand corner give the number of observations.

TABLE 50.—*Altitude of clouds during pilot-balloon ascents at Little America*

Number of ascent	Date	Time	Clouds and cloudiness	Altitude	Direction from—	Number of ascent	Date	Time	Clouds and cloudiness	Altitude	Direction from—
		h. m.	*Stratus*	*Meters*				h. m.	*Stratus*	*Meters*	
5	Jan. 20, 1929	13 22	5 A. St., 3 St	364	SSE.	640	July 27, 1934	13 50	10 St	216	N.
40	Feb. 23, 1929	20 9	4 A. St., 5 St	216	SE.	647	July 31, 1934	19 59	do	1, 710	E.
49	Feb. 28, 1929	19 52	9 St	864	NNE.	651	Aug. 3, 1934	9 25	do	1, 620	E.
50	Mar. 1, 1929	18 50	3 Ci., 6 St	801	N.	660	Aug. 8, 1934	8 55	do	315	NNW.
54	Mar. 5, 1929	9 0	10 St	846	NE.	661	do	20 07	do	990	ESE.
67	Mar. 20, 1929	8 35	10 St	474	NE.	662	Aug. 9, 1934	11 37	do	990	NE.
149	June 19, 1929	14 37	do	747	N.	672	Aug. 14, 1934	16 53	do	612	WNW.
157	June 28, 1929	14 23	do	574	NNE.	674	Aug. 16, 1934	21 12	do	612	ENE.
165	July 5, 1929	14 47	do	315	ESE.	695	Sept. 2, 1934	9 58	do	612	NNE.
218	Sept. 5, 1929	14 02	do	513	WNW.	728	Sept. 24, 1934	14 35	do	1, 710	SSE.
244	Sept. 30, 1929	9 49	9 St	513	N.	731	Sept. 27, 1934	8 23	do	216	SSW.
257	Oct. 8, 1929	18 52	10 St	657	NE.	743	Oct. 5, 1934	11 30	do	2, 070	E.
271	Oct. 19, 1929	8 55	do	923	NNE.	749	Oct. 13, 1934	9 0	do	1, 710	ENE.
286	Nov. 2, 1929	17 40	do	891	NNW.	750	do	16 20	do	1, 710	NE.
289	Nov. 4, 1929	9 26	do	1, 530	ESE.	751	do	8 20	do	612	NNE.
351	Dec. 10, 1929	9 39	9 St	546	E.	752	Oct. 14, 1934	19 15	do	1, 350	N.
359	Dec. 16, 1929	10 31	do	943	SW.	753	Oct. 15, 1934	18 20	do	513	NNW.
377	Jan. 2, 1930	15 47	1 Ci., 8 St	612	NNW.	754	Oct. 16, 1934	9 23	do	801	NW.
423	Apr. 4, 1934	14 25	10 St	414	NNW.	757	Oct. 18, 1934	13 30	9 St	706	NE.
425	Apr. 5, 1934	8 27	do	706	NE.	758	do	16 12	8 St	1, 350	SSW.
426	do	14 26	do	801	NE.	770	Oct. 23, 1934	19 23	10 St	706	SW.
428	Apr. 6, 1934	9 24	do	612	ENE.	771	Oct. 24, 1934	10 10	do	1, 170	NE.
429	do	15 18	do	513	NE.	772	do	18 22	3 A. St., 7 St	1, 890	NE.
430	do	19 43	do	990	NNE.	789	Nov. 3, 1934	1 50	7 A. Cu., 2 St	612	N.
431	Apr. 7, 1934	8 15	do	1, 440	N.	790	do	14 27	10 St	1, 170	ENE.
432	do	13 36	do	1, 350	NNE.	792	Nov. 4, 1934	20 30	do	706	NNE.
438	Apr. 9, 1934	14 15	do	414	NE.	793	Nov. 5, 1934	8 56	do	990	S.
439	Apr. 10, 1934	8 01	do	1, 350	ENE.	794	do	16 22	5 St. Cu., 5 St	1, 350	WSW.
440	do	14 03	do	990	SSE.	795	do	21 45	10 St	216	SW.
442	Apr. 11, 1934	8 16	do	2, 070	NNE.	796	Nov. 6, 1934	8 43	do	414	SSE.
449	Apr. 13, 1934	13 18	9 St	414	ESE.	798	Nov. 7, 1934	3 10	do	216	WSW.
450	do	18 33	10 St	612	WNW.	799	do	13 42	do	315	NW.
454	Apr. 15, 1934	8 07	do	216	SE.	800	Nov. 8, 1934	9 40	do	216	S.
465	Apr. 19, 1934	8 20	do	414	E.	801	do	21 24	do	414	SW.
466	do	14 15	do	706	NNE.	803	Nov. 9, 1934	19 36	9 St	706	NW.
467	do	20 07	do	801	SE.	812	Nov. 13, 1934	14 15	10 St	990	N.
470	Apr. 21, 1934	8 27	do	414	ESE.	813	do	20 25	do	1, 350	NE.
473	Apr. 22, 1934	8 18	do	801	NNW.	837	Nov. 22, 1934	20 20	do	513	S.
474	do	12 27	do	895	NNW.	846	Nov. 27, 1934	9 35	4 St. Cu., 4 St	990	N.
478	Apr. 25, 1934	8 08	do	801	N.	851	Nov. 30, 1934	15 38	2 A. St., 7 St	612	ESE.
479	do	14 10	5 Ci. St., 5 St	612	NNE.	852	Dec. 1, 1934	8 34	10 St	706	NE.
481	Apr. 26, 1934	9 0	10 St	990	NE.	856	Dec. 2, 1934	20 08	do	612	SE.
484	Apr. 27, 1934	7 57	do	1, 890	NE.	864	Dec. 6, 1934	9 08	do	1, 080	WSW.
485	do	12 32	do	1, 530	E.	865	do	13 35	do	1, 530	W.
486	do	19 40	do	1, 350	E.	866	do	19 52	do	1, 170	W.
487	Apr. 28, 1934	7 53	do	990	NE.	876	Dec. 10, 1934	14 00	do	801	NE.
493	May 1, 1934	8 30	9 A. St	315	S.	893	Dec. 16, 1934	9 30	do	414	W.
498	May 2, 1934	19 33	10 St	414	NNW.	897	Dec. 18, 1934	8 05	do	801	NW.
504	May 5, 1934	15 0	9 St	1, 350	S.	898	do	14 38	do	1, 170	N.
516	May 10, 1934	15 0	10 St	801	NNE.	900	Dec. 19, 1934	8 22	do	801	N.
517	May 11, 1934	9 0	do	414	NNE.	901	do	20 45	do	612	NE.
518	do	21 44	do	801	ESE.	904	Dec. 21, 1934	8 45	10 Ci. St., 5 St	706	E.
521	May 12, 1934	20 55	do	1, 350	N.	905	Dec. 22, 1934	18 18	10 St	414	WSW.
524	May 14, 1934	10 0	do	513	ESE.	932	Jan. 4, 1935	9 05	do	1, 710	E.
525	do	21 03	do	2, 430	SE.	942	Jan. 7, 1935	9 20	do	414	S.
529	May 16, 1934	14 25	do	612	NNE.	943	do	21 56	9 St	216	SSW.
530	May 17, 1934	15 15	do	801	NW.	952	Jan. 12, 1935	9 55	10 St	216	ESE.
541	May 22, 1934	9 50	do	414	NNE.	953	do	22 15	9 St	216	S.
543	May 24, 1934	21 50	do	216	SE.	954	Jan. 13, 1935	15 32	10 St	315	SSE.
545	May 25, 1934	15 35	5 St	990	NNE.	955	Jan. 14, 1935	9 05	do	414	ESE.
548	May 28, 1934	20 20	10 St	1, 530	NE.	956	Jan. 15, 1935	8 46	do	706	WNW.
549	May 29, 1934	10 50	do	1, 530	NE.	957	Jan. 16, 1935	8 33	do	414	SW.
554	June 4, 1934	16 03	do	414	NNE.	958	Jan. 17, 1935	8 45	do	1, 530	SSE.
555	June 5, 1934	9 25	5 St	1, 530	ENE.	959	do	20 35	5 St. Cu., 4 St	1, 170	SE.
564	June 8, 1934	21 44	10 St	1, 890	ENE.	960	Jan. 18, 1935	8 50	1 St. Cu., 9 St	1, 620	NE.
565	June 10, 1934	17 0	do	1, 710	ENE.	961	Jan. 19, 1935	9 10	4 St. Cu., 6 St	1, 710	NE.
570	June 15, 1934	9 31	9 St	1, 530	ENE.	962	do	20 30	9 St	990	ENE.
572	do	21 35	10 St	2, 070	ESE.	971	Jan. 25, 1935	20 25	10 St	1, 350	NE.
573	June 16, 1934	21 35	do	990	N.	972	Jan. 27, 1935	13 28	do	315	NNE.
578	June 20, 1934	21 46	do	2, 070	E.	973	Jan. 28, 1935	9 12	do	801	ENE.
586	June 26, 1934	9 30	do	414	ENE.	974	do	14 17	do	1, 080	ESE.
598	July 1, 1934	9 56	do	414	WNW.	975	Jan. 29, 1935	8 30	do	216	NE.
612	July 9, 1934	11 44	do	1, 530	ESE.	976	Jan. 30, 1935	12 50	do	1, 530	NE.
621	July 15, 1934	10 16	do	801	E.	977	do	17 30	do	414	NNE.
629	July 19, 1934	13 35	do	801	NW.	979	Jan. 31, 1935	8 42	do	1, 170	NNW.
630	July 20, 1934	7 35	do	801	NW.	980	do	13 30	do	612	NNE.
635	July 22, 1934	22 40	7 St	1, 890	SSE.	981	Feb. 1, 1935	9 40	do	990	NNE.
638	July 25, 1934	21 40	10 St	612	ENE.	982	do	14 48	do	1, 170	E.
639	July 26, 1934	20 07	do	612	NE.						

TABLE 50.—*Altitude of clouds during pilot-balloon ascents at Little America*—Continued

Number of ascent	Date	Time	Clouds and cloudiness	Altitude	Direction from—
		h. m.	*Strato-Cumulus*	*Meters*	
3	Jan. 18, 1929	13 03	8 St. Cu	2,070	SSE.
18	Feb. 2, 1929	19 30	6 A. St., 4 St. Cu.	1,125	W.
26	Feb. 15, 1929	20 12	6 A. Cu., 4 St. Cu.	1,350	NNW.
41	Feb. 24, 1929	19 30	10 St. Cu	2,160	NE.
47	Feb. 27, 1929	19 23	1 Ci., 8 St. Cu	891	NE.
48	Feb. 28, 1929	8 09	9 St. Cu	1,125	NW.
51	Mar. 3, 1929	8 45	10 St. Cu	1,845	NW.
74	Mar. 24, 1929	8 56	3 A. Cu., 6 St. Cu.	2,430	NE.
194	Aug. 6, 1929	21 57	St. Cu., few St	1,530	ENE.
202	Aug. 15, 1929	19 39	9 St. Cu., few St.	1,620	E.
203	Aug. 18, 1929	20 20	7 St. Cu., Few St.	2,250	NE.
245	Oct. 1, 1929	15 05	10 St. Cu	1,305	ENE.
247	Oct. 2, 1929	17 18	7 St. Cu	1,710	SSW.
254	Oct. 6, 1929	8 38	10 St. Cu	2,250	ESE.
287	Nov. 3, 1929	9 05	do	1,575	NW.
288	do	21 47	9 St. Cu	2,025	W.
291	Nov. 5, 1929	21 0	do	1,440	SE.
292	Nov. 6, 1929	9 41	10 St. Cu	1,770	ESE.
293	Nov. 7, 1929	9 24	9 St. Cu	1,770	N.
294	Nov. 8, 1929	13 50	10 St. Cu	801	NW.
303	Nov. 14, 1929	9 40	do	1,105	N.
322	Nov. 24, 1929	11 06	do	2,520	WNW.
325	Nov. 26, 1929	13 44	8 St. Cu	2,250	SE.
330	Nov. 28, 1929	13 30	do	2,430	ESE.
333	Nov. 29, 1929	21 39	9 St. Cu	1,230	N.
352	Nov. 30, 1929	15 43	1 Ci. St., 7 St. Cu.	1,440	WNW.
356	Dec. 12, 1929	22 0	9 St. Cu	2,070	N.
366	Dec. 22, 1929	21 34	do	1,170	NE.
367	Dec. 24, 1929	18 02	do	1,305	NNW.
376	Jan. 1, 1930	21 46	do	895	WNW.
378	Jan. 3, 1930	22 0	10 St. Cu	1,410	NNE.
391	Jan. 14, 1930	9 10	9 St. Cu	1,440	W.
392	Jan. 15, 1930	9 23	8 St. Cu	1,830	NNW.
396	Jan. 18, 1930	9 29	10 St. Cu	1,470	SSE.
403	Jan. 24, 1930	9 10	9 St. Cu	1,770	S.
482	Apr. 26, 1930	14 27	do	1,265	SE.
724	Sept. 18, 1930	20 32	10 St. Cu	990	NW.
756	Oct. 17, 1930	11 35	2 A. Cu., 5 St. Cu.	1,890	NW.
759	Oct. 19, 1930	8 20	10 St. Cu	1,080	SSE.
761	Oct. 20, 1930	8 48	9 St. Cu	1,890	NNE.
762	do	18 30	5 Ci., 2 St. Cu	1,710	SE.
791	Nov. 4, 1930	9 23	9 St. Cu	1,530	N.
802	Nov. 9, 1930	8 30	10 St. Cu	1,170	NNW.
804	Nov. 10, 1930	8 36	8 St. Cu	801	SSW.
830	Nov. 19, 1930	14 32	Few Ci., 1 Ci. St., 1 A. St., 7 St. Cu.	1,350	NW.
844	Nov. 26, 1930	20 42	9 St. Cu	2,160	NNE.
853	Dec. 1, 1930	14 20	4 A. St., few Cu.	513	ENE.
859	Dec. 4, 1930	13 05	5 St. Cu., 5 St	414	ESE.
861	Dec. 5, 1930	9 02	10 St. Cu	1,440	SSW.
863	do	18 36	do	990	SW.
902	Dec. 20, 1930	8 32	do	990	NW.
966	Jan. 22, 1935	8 40	9 St. Cu	216	SW.
967	do	20 08	10 St. Cu	801	NW.
			Alto-Stratus		
6	Jan. 21, 1929	21 06	8 A. St	3,600	NE.
8	Jan. 23, 1929	19 37	9 A. St	1,305	S.
17	Feb. 1, 1929	13 17	9 A. St., few St. Cu.	2,856	NE.
43	Feb. 25, 1929	20 10	2 Ci. St., 5 A. St.	3,690	SSW.
44	Feb. 26, 1929	8 40	9 A. St	1,395	E.
45	Feb. 27, 1929	8 10	9 A. St., few Ci	3,510	NNW.
65	Mar. 19, 1929	9 45	2 Ci. St., 7 A. St.	3,690	WNW.
66	do	17 19	10 A. St	5,130	NNW.
68	Mar. 20, 1929	15 58	5 A. St., 3 St	3,690	N.
75	Mar. 29, 1929	15 10	9 A. St., 1 St	2,070	WNW.
151	June 21, 1929	9 57	10 A. St	2,475	E.
154	June 23, 1929	14 32	6 Ci. St., 4 A. St.	3,150	NNE.
212	Aug. 30, 1929	14 10	10 A. St	1,530	S.
229	Sept. 16, 1929	7 17	do	1,890	NW.
231	Sept. 18, 1929	21 15	9 A. St., 1 St. Cu.	2,790	E.
236	Sept. 25, 1929	17 29	10 A. St	4,050	E.
253	Oct. 5, 1929	18 36	do	2,025	E.
329	Nov. 28, 1929	10 50	3 A. St	1,890	ENE.
339	Dec. 3, 1929	22 05	10 A. St	2,790	ENE.
364	Dec. 20, 1929	20 47	9 A. St	3,510	ESE.
379	Jan. 5, 1930	20 35	9 A. St., few Ci. St.	1,710	NE.
380	Jan. 6, 1930	10 08	9 A. St., 1 Ci. St.	1,350	NE.
381	do	20 47	9 A. St	2,430	NE.
415	Mar. 30, 1934	14 25	10 A. St	3,150	N.
427	Apr. 5, 1934	20 10	do	2,430	ENE.
434	Apr. 8, 1934	8 20	do	2,250	NNE.
435	do	14 47	do	2,610	NE.
443	Apr. 11, 1934	15 02	do	3,150	ENE.
456	Apr. 16, 1934	8 10	do	2,790	E.
457	do	14 17	do	2,250	ESE.
458	do	20 12	do	3,150	E.
468	Apr. 20, 1934	11 41	do	2,430	N.
471	Apr. 21, 1934	13 15	do	2,610	NNE.
476	Apr. 24, 1934	6 46	do	2,070	E.
480	Apr. 25, 1934	20 10	7 A. St	1,890	NE.
496	May 2, 1934	8 09	9 A. St	2,250	S.
526	May 15, 1934	9 30	3 A. St., few St. Cu.	4,230	ESE.
542	May 23, 1934	9 55	10 A. St	3,330	NNW.
546	May 25, 1934	20 35	do	2,610	NE.
547	May 26, 1934	21 30	6 A. St	3,510	NNE.
569	June 13, 1934	16 20	10 A. St	2,430	N.
584	June 25, 1934	15 45	do	2,430	ENE.
587	June 26, 1934	20 28	8 A. St	3,150	NE.
588	June 27, 1934	9 15	5 A. St	4,230	E.
650	Aug. 2, 1934	9 40	8 A. St., few Ci. St.	3,330	ENE.
655	Aug. 5, 1934	13 0	8 A. St	3,330	NNE.
656	Aug. 6, 1934	14 40	10 A. St	4,230	SSE.
658	Aug. 7, 1934	9 44	5 A. St	3,150	S.
664	Aug. 10, 1934	9 55	10 A. St	3,150	NE.
668	Aug. 12, 1934	9 16	8 A. St	5,130	SE.
673	Aug. 15, 1934	12 05	9 A. St	3,330	WNW.
682	Aug. 25, 1934	11 30	8 A. St	3,330	SSE.
693	Sept. 1, 1934	10 18	10 A. St	3,510	ENE.
707	Sept. 8, 1934	10 40	7 A. St	2,250	SW.
726	Sept. 23, 1934	14 05	10 A. St	2,430	N.
737	Sept. 30, 1934	8 42	do	3,150	WNW.
745	Oct. 11, 1934	9 48	do	3,330	E.
746	do	14 0	do	5,310	ENE.
763	Oct. 21, 1934	20 12	4 Ci. St., 4 A. St.	2,790	S.
773	Oct. 25, 1934	10 05	10 A. St	2,610	N.
824	Nov. 17, 1934	13 55	8 A. St	2,790	S.
828	Nov. 19, 1934	0 24	2 Ci., 2 A. St	5,130	ESE.
849	Nov. 29, 1934	9 12	5 Ci. St., 4 A. St.	4,050	E.
850	do	18 55	9 A. St	2,520	ENE.
854	Dec. 2, 1934	8 15	5 A. Cu., 4 A. St.	2,430	ENE.
883	Dec. 12, 1934	12 31	2 Ci., 5 A. St	4,230	SE.
895	Dec. 17, 1934	8 45	4 A. Cu., 5 A. St., few St.	2,430	N.
896	do	18 10	5 A. Cu., 5 A. St.	2,430	W.
909	Dec. 24, 1934	8 55	2 Ci. St., 7 A. St.	3,510	SSE.
934	Jan. 4, 1935	21 05	9 A. St	4,050	SE.
969	Jan. 25, 1935	9 0	5 A. Cu., 4 A. St.	4,950	NNW.
970	do	13 53	3 A. Cu., 7 A. St.	3,870	N.

TABLE 50.—*Altitude of clouds during pilot-balloon ascents at Little America*—Continued

Number of ascent	Date	Time	Clouds and cloudiness	Altitude	Direction from—	Number of ascent	Date	Time	Clouds and cloudiness	Altitude	Direction from—
		h. m.	*Alto-Cumulus*	*Meters*				h. m.	*Cirro-Stratus*	*Meters*	
21	Feb. 6, 1929	9 14	4 A. Cu., 3 A. St., 1 Cu.	2,070	W.	7	Jan. 22, 1929	13 05	1 Ci. St., 3 A. Cu., 3 A. St.	4,590	NNW.
24	Feb. 13, 1929	19 30	5 A. Cu., 4 St. Cu.	2,250	NE.	33	Feb. 20, 1929	8 26	3 Ci. St., 2 St. Cu.	4,770	NNW.
25	Feb. 14, 1929	16 56	7 A. Cu., 1 St. Cu.	3,285	WNW.	55	Mar. 7, 1929	8 40	5 Ci. St., 3 A. Cu.	4,950	ESE.
46	Feb. 27, 1929	8 10	9 A. Cu., few Ci.	3,510	NNW.	69	Mar. 21, 1929	11 35	8 Ci. St., 2 A. St.	4,410	NE.
56	Mar. 7, 1929	20 20	4 Ci., 5 A. Cu	4,950	NNW.						
327	Mar. 27, 1929	9 46	5 A. Cu., 4 St. Cu.	2,790	W.	70	Mar. 22, 1929	5 50	9 Ci. St	6,930	NNE.
						97	Apr. 23, 1929	11 11	8 Ci. St	7,290	ENE.
328	do	19 16	7 A. Cu	2,505	SW.	105	Apr. 29, 1929	10 40	9 Ci. St	2,790	ENE.
353	Dec. 11, 1929	11 23	8 A. Cu	2,790	S.	263	Oct. 13, 1929	9 23	8 Ci. St	2,790	ESE.
354	do	21 51	3 A. Cu	3,510	S.	274	Oct. 26, 1929	9 30	8 Ci. St	4,770	ESE.
360	Dec. 17, 1929	10 46	9 A. Cu	3,690	NE.	279	Oct. 29, 1929	18 51	9 Ci. St	3,870	S.
363	Dec. 20, 1929	9 32	4 A. St., 3 A. Cu.	2,250	ENE.	280	do	20 02	7 Ci. St	5,670	E.
						445	Apr. 12, 1934	8 23	8 Ci. St	5,130	E.
519	May 12, 1934	9 55	9 A. Cu	2,070	SE.	446	do	14 14	do	7,650	ENE.
581	June 22, 1934	12 30	8 A. Cu	3,150	ESE.	460	Apr. 17, 1934	14 0	1 Ci., 6 Ci. St	5,490	NNE.
637	June 23, 1934	20 10	7 A. Cu	3,330	WNW.	933	Jan. 4, 1935	15 35	8 Ci. St., 1 A. St.	4,950	E.
729	Sept. 26, 1934	11 30	8 A. Cu	2,970	ESE.						
788	Nov. 2, 1934	20 10	do	2,970	N.				*Cirrus*		
815	Nov. 14, 1934	15 57	6 A. Cu., 1 A. St.	2,790	SE.	417	Mar. 31, 1934	8 44	8 Ci., 2 Ci. St	5,670	NNW.
						462	Apr. 18, 1934	8 30	2 Ci., few A. Cu. and A. St.	5,850	ENE.
855	Dec. 2, 1934	14 05	7 A. Cu., few Cu.	3,150	E.						
884	Dec. 12, 1934	18 25	9 A. Cu	2,790	SE.	910	Dec. 24, 1934	12 45	4 Ci., 3 Ci. St	6,390	S.
964	Jan. 21, 1935	9 0	7 A. Cu., 1 A. St.	3,690	ESE.	923	Dec. 31, 1934	19 05	3 Ci., 5 Ci. St	4,590	ESE.

TABLE 51.—*The average height of the different cloud forms at Little America as determined from pilot-balloon ascents, combined data, 1929 and 1934*

	Cloud form								
	St.	Nb.	Cu.	St. Cu.	A. Cu.	A. St.	Ci. Cu.	Ci. St.	Ci.
LIGHT SEASON									
Number of observations	80	0	0	48	16	34	0	10	3
Mean height (m.)	852			1,478	3,062	3,124		4,770	5,550
DARK SEASON									
Number of observations	77	0	0	5	4	38	0	5	1
Mean height (m.)	934			1,531	2,880	2,948		5,670	5,850
YEAR									
Number of observations	157	0	0	53	20	72	0	15	4
Mean height (m.)	892			1,483	3,025	3,031		5,070	5,625

TABLE 52.—*Comparison of mean direction of cloud motion and mean direction of wind at Little America*

	Lower clouds (St.)	Number of observations	Intermediate clouds (A St.)	Number of observations	Upper clouds (Ci. St.)	Number of observations
Mean height of clouds (m.)	892	157	3,031	72	5,070	15
Mean direction of clouds [1]	N. 50° E	557	N. 58° E	278	N. 7° W	134
Mean direction of wind	S. 23° E	854	S	549	N. 55° W	318
Difference	107°		122°		−48°	
Resultant direction of wind	S. 13° E	854	S. 29° W	549	S. 85° W	318
Difference	117°		151°		−88°	

[1] From surface eye observations.

7. RELATIVE HUMIDITY, PRECIPITATION AND VISIBILITY

The mean relative humidity for the different months and seasons is given in table 53 and has been computed from the hourly values of humidity as determined by the registration of the hair hygrograph. The poor behavior of the hair element at low temperatures is well known and consequently no great accuracy can be claimed for the values given, especially in the winter months.

The number of days in each month with different forms of precipitation and also with dense fog is given in table 54. The large number of days with snowfall should not

be interpreted as indicating correspondingly large amounts of snowfall, since in many of these cases the snowfall was very light, consisting of very small flakes and not amounting to more than a trace. The mist referred to was extremely light, so light, in fact, that it was just barely perceptible. Notes concerning this will be found in the volume of observational data. Showers of minute particles of clear ice, usually having an elongated form and sometimes referred to as ice spicules or ice needles (referred to simply as ice crystals here), were of fairly frequent occurrence and were often present with a perfectly clear sky.

In 1929, observations of visibility were made three times daily as part of the regular surface observation, and the mean values for the different months and seasons are given in table 55. The scale of visibility used was as follows:

Visibility scale

Scale	Descriptive term	Limiting distance (meters)
0	Dense fog—prominent objects not visible at	50
1	Very bad—prominent objects not visible at	200
2	Bad—prominent objects not visible at	500
3	Very poor—prominent objects not visible at	1,000
4	Poor—prominent objects not visible at	2,000
5	Indifferent—prominent objects not visible at	4,000
6	Fair—prominent objects not visible at	10,000
7	Good—prominent objects not visible at	20,000
8	Very good—prominent objects not visible at	50,000
9	Excellent—prominent objects visible beyond	50,000

Table 54 also includes values for the total snowfall for each month in 1939. In the Antarctic most of the snowfall occurs with fairly high winds, making the measurement as well as any estimate of the amount of snowfall difficult since the falling snow is mixed with drifting surface snow; the difficulty is further enhanced by the tendency of the wind to sweep the newly fallen snow along the surface. In these instances the amount of snowfall was "estimated" as closely as possible by taking into account its intensity and duration. When the snowfall occurred with light winds, the depth of the newly fallen snow on the surface was measured directly (without the use of a snow gage) and the amounts given in these instances (see (1) table 24) can be regarded as quite accurate. Owing to the difficulty of estimating the amount of snowfall, it is hard to say how much weight can be given to the monthly values given in the table; H. T. Harrison who made the estimates as well as the measurements, is of the opinion that the daily amounts when determined by estimate may in some cases differ from the true fall by as much as 50 percent, but that the relative snowfall by months can be accepted as fairly accurate. From his own experience the writer is of the opinion that, if anything, the values given are too large; at least, over a period of a year, there is certainly no *accumulation* of snow at all comparable with the values given in the table. In August 1934, the writer planted two small brass rods at two widely separated locations where the barrier was flat and smooth. These were inspected five months later in January and each showed an accretion to the surface of about 6 inches. This accretion, of course, represents the combined effect of drift and snow, and just how much of each it is impossible to state. The above amount if extrapolated linearly over a 12 months' period would give an annual amount of 14 inches.

TABLE 53.—*Mean relative humidity at Little America by months and seasons, percent*

	January 1929	February 1929	March 1929	April 1929	May 1929	June 1929	July 1929	August 1929	September 1929	October 1929	November 1929	December 1929	January 1930	1929
Mean	------	[1] 75.6	[2] 72.3	[3] 90.9	81.4	84.5	77.7	87.2	81.0	85.6	81.3	83.4	81.7	82.2
	January 1934	February 1934	March 1934	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934	January 1935	1934
Mean	------	[4] 90.0	80.8	87.0	85.2	91.1	83.7	81.3	79.4	80.4	82.3	82.1	85.6	83.5
Combined data	------	83.7	77.6	88.4	82.8	86.9	80.7	84.3	80.2	83.0	81.8	82.7	83.6	82.9

Year	Summer	Fall	Winter	Spring	Light	Dark
1929	81.4	81.2	83.1	82.6	81.2	83.1
1934	85.1	84.3	84.4	80.7	83.0	84.0
Combined data	83.3	82.9	83.7	81.7	82.1	83.6

[1] Mean for last 13 days of February 1929.
[2] Month of March incomplete only 420 out of possible 744 observations.
[3] Mean for last 15 days and 9 hours of April 1929.
[4] Mean for last 16 days and 8 hours of February 1934.

TABLE 54.—*Number of days in each month with different forms of precipitation at Little America*

NUMBER OF DAYS WITH SNOW OR GRAUPEL

Year	January	February	March	April	May	June	July	August	September	October	November	December	January
1929	16	13	21	17	20	22	13	11	8	12	14	11	[1] 14
1934	------	------	11	14	17	13	15	10	7	12	12	15	[2] 15

NUMBER OF DAYS WITH MIST

1929	1	1	0	0	0	2	0	1	0	0	0	2	[1] 0
1934	------	------	1	0	0	1	1	0	0	0	0	0	[2] 2

NUMBER OF DAYS WITH DENSE FOG

1929	4	1	0	6	0	1	0	4	6	6	2	7	[1] 3
1934	------	------	3	6	3	2	6	5	3	6	7	11	[2] 5

NUMBER OF DAYS WITH FALLING ICE CRYSTALS

1929	0	1	0	3	3	2	4	5	4	3	2	0	[1] 1
1934	------	------	1	0	7	6	14	14	11	6	4	6	[2] 0

[1] January, 1930.
[2] January, 1935.

Total snowfall at Little America for each month, 1929 (unmelted), inches

January 1929	7.3	May 1929	7.6	September 1929	2.4	January 1930	6.5
February 1929	12.7	June 1929	16.2	October	2.0	Year 1929	103.5
March 1929	24.2	July 1929	8.9	November 1929	2.9		
April 1929	5.6	August 1929	11.3	December 1929	2.3		

TABLE 55.—*Mean visibility at Little America by months and seasons, 1929*

	January 1929	February 1929	March 1929	April 1929	May 1929	June 1929	July 1929	August 1929	September 1929	October 1929	November 1929	December 1929	January 1930	Summer 1929	Autumn 1929	Winter 1929	Spring 1929	Year 1929
Mean visibility, (0–9)	6.9	6.3	5.8	6.4	6.0	-----	-----	6.9	6.7	6.8	7.2	7.0	6.6	6.8	6.0	6.9	6.9	6.6

8. METEOROLOGICAL CONDITIONS DURING "CLEAR" PERIODS AT LITTLE AMERICA

One of the most difficult and important duties confronting the polar expedition meteorologists is the forecasting of periods of good flying weather for the various expedition aviation activities. This is especially difficult in the Antarctic, where the meteorologist is forced to estimate future weather conditions from the meteorological observations at a single station. Because of this difficulty it was thought that a statistical study of the periods of favorable flying weather might be of some value and the following tables were prepared for the purpose of investigating the occurrence and frequency of periods of weather favorable for flying, as well as the meteorological conditions prevailing during such periods.

Of the various hazards connected with polar flying, the first and foremost is that of clouds; and it therefore falls upon the polar meteorologist to predict periods of clear sky, both as to time of occurrence and as to length of period. Cloudy skies not only produce poor light conditions, making it difficult to get satisfactory aerial mapping photographs and to use navigation instruments (such as sun compass), but also when there is a stratus or thick altostratus overcast it is usually very difficult to distinguish a horizon—the snow surface and cloud layer seem to fuse into one without any visible line of separation or horizon—making an accurate judgment of distance and altitude difficult for the pilot, and landing, forced or otherwise, a dangerous undertaking. There is, in addition, the usual hazard of having to come down through a low overcast which may have formed during the flight, and make a forced landing on terrain of unknown elevation. Finally, it is important to have clear conditions, not only during the flight, but also when the plane returns to the base, since in addition to the difficulty of landing with poor horizon conditions attending overcast skies mentioned above, there is the added difficulty of finding the base itself if the plane is forced to fly above a low stratus overcast.

At Little America, extended periods of *absolutely* cloudless sky are not very frequent; and since airplane flights can be successfully carried out even though the sky is not absolutely clear, the following definition of clear period has been used, based on the usual cloudiness scale, 0–10, referring to the number of tenths of sky containing cloud:

> There shall not be more than five-tenths of upper clouds, such as Ci, CiSt, and CiCu; there shall not be more than two-tenths of intermediate clouds, such as ASt and ACu; there shall not be more than one-tenth of lower clouds, such as St, StCu, and Cu.

Using this definition of a clear period, table 56 has been constructed, which gives the beginning, ending, and length of the periods, and the pilot-balloon, kite, and airplane ascents made during the periods. There are also given mean values of the various meteorological elements during the periods as computed from hourly values, and the departures of these means from the monthly means. Only periods of 12 hours or more duration are given, since clear periods shorter than this are probably not of much value in planning extended flights.

In column 15 of table 56 is entered the type of pressure variation association with each period; and the amount of this variation is given in column 2. For cases when the pressure was rising, falling, or steady, this is simply the amount of pressure fall or rise from the beginning to the end of the period. In the case when the pressure rose and then fell, the pressure change given was obtained by finding the amount of pressure rise from the beginning of the period to time of highest pressure and adding this to the amount of pressure fall from this point to the end of the period without regard to sign, thus giving the *total* variation in the pressure, and is indicated by a ± sign. In cases where the pressure fell and then rose, the pressure change was computed in a similar manner and is indicated by a ± sign.

Although the definition of clear weather used was quite liberal, allowing a maximum total cloudiness of eight-tenths, it is seen that the actual cloudiness during the periods turns out to be quite small. Nearly all of the periods have a mean cloudiness of less than one-tenth (1.0); and there are only a few with two-tenths or more, the greatest being 3.8 for period no. 47. The clear periods thus turn out to have much less cloudiness than one might expect from the definition used; and although the tables were originally constructed for the purpose of studying conditions favorable for aviation activities, it is thought that they are at the same time quite suitable for use in connection with any other meteorological studies relating to clear weather.

The clear periods in table 56 have been combined by months and the results are given in table 57.

It was found that clear weather could occur with almost any type of pressure change. The pressure changes have been separated into the following five types:

Pressure rising.
Pressure falling.
Pressure steady.
Pressure rising and then falling.
Pressure falling and then rising.

In table 61 are given the different clear periods during which the change in pressure was of one of the above types, and also the length of clear weather and amount of pressure change associated with each type.

The results of pilot-balloon ascents made during clear periods have been evaluated and are given for the four seasons and for the year in table 62, the north-south and east-west components referring to the resultant velocity. The percentage frequency and mean velocity of the different wind directions at standard levels during these periods are given in tables 63 and 63A; while the mean turning of the wind from the surface up to given levels during clear periods is shown in table 64.

The results of pilot-balloon ascents made during the different types of pressure change associated with the clear periods have been computed and are contained in tables 65 to 71. For the periods with pressure rising and then falling, the computation was made separately for the interval with rising pressure and that with falling pressure, and similarly for periods with pressure falling and then rising. This was done since it was anticipated that upper level wind conditions with rising pressure would differ from those with falling pressure. In order to see, if possible, what changes take place in the upper level winds during the transition to a clear period, the results have also been computed for the 24- to 36-hour interval preceding the clear periods associated with the different types of pressure change and are given in tables 72 to 76.

TABLE 56.—*Periods with "clear" sky at Little America*

Number of period	Date		(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	From—	To—	Length of period (hours)	Mean pressure during period sea level (inches)	Pressure change during period (inch)	Mean cloudiness during period (0-10)	Mean velocity during period (m. p. h.)	Prevailing wind direction during period	Mean temperature during period (°F)	Mean pressure for month sea level (inches)	Mean velocity for month (m. p. h.)	Mean temperature for month (°F)	(1-7) (inch)	(4-8) (m. p. h.)	(6-9) (°F)	Pilot-balloon ascents during period (No.)	Kite and airplane ascents during period (No.)	Type of pressure change during period
1	Jan. 15, 1929, 20h.	Jan. 17, 1929, 1h.	29	29.568	−0.20	1.5	8.1	S.	10.5	29.419	9.5	21.1	0.149	−1.4	−10.6	1		Pressure falling.
2	Jan. 27, 1929, 6h.	Jan. 27, 1929, 23h.	17	29.314	.19	.7	9.2	SW.	20.4	29.419	9.5	21.1	−.105	−0.3	−.7	12		Pressure rising.
3	Jan. 31, 1929, 1h.	Jan. 31, 1929, 22h.	21	29.063	−.22	Few	9.9	E	5.8	29.419	9.5	21.1	−.356	.4	−15.3	16		Pressure falling.
4	Feb. 18, 1929, 5h.	Feb. 19, 1929, 23h.	42	29.310	.08	.2	9.3	E.		29.197	11.1	11.0	.113	−1.8	−15.2	29, 30, 31, 32		Pressure steady.
5	Mar. 22, 1929 17h.	Mar. 23, 1929, 18h.	25	28.962	−.28	1.2	6.1	S.	−32.6	29.190	12.9	−5.0	−.228	−6.8	−27.6	71, 72		Pressure falling.
6	Apr. 4, 1929, 2h.	Apr. 5, 1929, 2h.	24	29.301	.10	.9	5.1	S.	−41.1	29.270	8.4	−29.7	.031	−3.3	−11.4	82, 83		Pressure rising.
7	Apr. 6, 1929, 18h.	Apr. 7, 1929, 9h.	15	29.321	−.02	1.9	9.6	S.	−26.3	29.270	8.4	−29.7	.051	1.2	3.4			Pressure steady.
8	Apr. 7, 1929, 20h.	Apr. 8, 1929, 11h.	15	29.389	−.04	.3	3.9	SW.	−35.3	29.270	8.4	−29.7	.119	−4.5	−5.6	85		Pressure falling.
9	Apr. 10, 1929, 8h.	Apr. 12, 1929, 1h.	41	29.142	±.28	.6	5.3	E.	−28.6	29.270	8.4	−29.7	−.128	−3.1	1.1	87, 88, 89		Pressure rising and then falling.
10	Apr. 17, 1929, 10h.	Apr. 18, 1929, 5h.	19	28.683	.10	.2	5.4	SW.	−34.4	29.270	8.4	−29.7	−.587	−3.0	−4.7	90		Pressure rising.
11	Apr. 24, 1929, 21h.	Apr. 25, 1929, 11h.	14	28.911	−.08	.5	4.1	S.	−57.4	29.270	8.4	−29.7	−.359	−4.3	−27.7	100		Pressure falling.
12	May 3, 1929, 24h.	May 7, 1929, 9h.	81	29.062	−.39	.7	5.3	S.	−39.9	28.908	8.8	−22.7	.154	−3.1	−17.2	108, 109, 110		Do.
13	May 7, 1929, 19h.	May 8, 1929, 10h.	15	28.869	−.03	.8	6.4	SW.	−46.8	28.908	8.8	−22.7	−.039	−2.4	−24.1	111		Do.
14	May 13, 1929, 13h.	May 16, 1929, 3h.	62	28.905	±.54	.5	4.7	SW.	−39.5	28.908	8.8	−22.7	−.003	−4.1	−16.8	113, 114, 115, 116		Pressure rising and then falling.
15	May 17, 1929, 16h.	May 18, 1929, 16h.	24	28.942	−.01	.5	5.7	SW.	−41.4	28.908	8.8	−22.7	.034	−3.1	−18.7	119, 120, 121		Pressure steady.
16	June 3, 1929, 1h.	June 5, 1929, 21h.	68	28,919	±1.59	.3	9.1	E.	−40.4	29.308	10.1	−10.6	−.389	−1.0	−29.8	127, 128, 129, 130, 131		Pressure falling and then rising.
17	June 12, 1929, 14h	June 13, 1929, 7h.	17	28.089	.04	.9	1.4	S.	−19.3	29.308	10.1	−10.6	−.219	−8.7	−8.7	143		Pressure steady.
18	June 15, 1929, 22h	June 16, 1929, 17h.	19	29.272	.05	.7	2.5	E.	−38.1	29.308	10.1	−10.6	−.036	−7.6	−27.5	146		Pressure falling.
19	June 29, 1929, 13h.	June 30, 1929, 8h.	19	29.688	−.02	.6	4.3	SW.	−28.1	29.308	10.1	−10.6	.380	−5.8	−17.5	158		Pressure steady.
20	July 1, 1929, 0h.	July 3, 1929, 8h.	56	29.445	−.40	Few	5.7	SW.	−54.3	28.967	7.9	−45.8	.478	−2.2	−8.5	160, 161, 162		Pressure falling.
21	July 3, 1929, 14h.	July 5, 1929, 14h.	48	29.187	±.74	.3	7.1	SW.	−56.8	28.967	7.9	−45.8	.220	−.06	−11.0	164		Pressure rising and then falling.
22	July 6, 1929, 19h.	July 13, 1929, 18h.	167	29.073	.24	1.1	6.4	SW.	−66.3	28.967	7.9	−45.8	.103	−1.5	−20.5	166, 167, 168, 169, 170 171, 172, 173, 174.		Do.
23	July 15, 1929, 16h.	July 18, 1929, 8h.	64	28.730	−.08	1.8	5.5	SW.	−45.6	28.967	7.9	−45.8	−.237	−2.4	.2	177, 178, 179, 180		Pressure steady.
24	July 23, 1929, 21h.	July 24, 1929, 16h.	19	29.036	.20	1.1	4.7	SW.	−50.9	28.967	7.9	−45.8	.069	−3.2	−5.1	185		Pressure rising.
25	July 26, 1929, 11h.	July 27, 1929, 8h.	21	28.425	−.05	.6	6.8	W.	−62.8	28.967	7.9	−45.8	−.542	−1.1	−17.0	187		Pressure steady.
26	July 27, 1929, 11h.	July 29, 1929, 8h.	45	28.985	.80	.1	4.8	S.	−66.8	28.967	7.9	−45.8	.018	−3.1	−21.0	189		Pressure rising.
27	Aug. 3, 1929, 17h.	Aug. 4, 1929, 8h.	15	29.273	−.21	.5	10.5	S.	−31.4	29.093	8.9	−28.0	.180	1.6	−3.4	192		Pressure falling.
28	Aug. 7, 1929, 15h.	Aug. 8, 1929, 8h.	17	29.512	−.10	.1	5.6	S.	−27.4	29.093	8.9	−28.0	.419	−3.3	.6	195		Do.
29	Aug. 8, 1929, 15h.	Aug. 9, 1929, 3h.	12	29.289	−.11	.8	5.8	S.	−42.6	29.093	8.9	−28.0	.196	−3.1	−14.6	196		Do.
30	Aug. 10, 1929, 2h.	Aug. 10, 1929, 15h.	13	29.052	.18	Few	3.3	S.	−54.5	29.093	8.9	−28.0	.041	−5.6	−26.4			Pressure rising.
31	Aug. 13, 1929, 14h.	Aug. 14, 1929, 5h.	15	28.920	.19	.3	3.9	W.	−58.4	29.093	8.9	−28.0	.173	−5.0	−30.4	200		Pressure rising.
32	Aug. 23, 1929, 12h.	Aug. 27, 1929, 11h.	95	28.893	±.64	.4	3.2	SW.	−52.8	29.093	8.9	−28.0	−.200	−5.7	−24.8	207, 208, 209		Pressure falling and then rising.
33	Aug. 27, 1929, 17h.	Aug. 28, 1929, 5h.	12	28.972	.00	1.9	3.7	SW.	−54.8	29.093	8.9	−28.0	−.121	−5.2	−26.5			Pressure steady.
34	Aug. 30, 1929, 21h.	Sept. 2, 1929, 4h.	55	28.840	±.41	.9	4.0	S.	−59.2	28.967	8.2	−44.2	−.127	−4.2	−15.0	213, 214		Pressure falling and then rising.
35	Sept. 3, 1929, 22h.	Sept. 5, 1929, 1h.	27	29.389	.22	2.2	3.9	W.	−50.1	28.967	8.2	−44.2	.422	−4.3	−5.9	217		Pressure rising.
36	Sept. 6, 1929, 10h.	Sept. 7, 1929, 21h.	35	29.788	±.32	1.0	6.1	SW.	−53.3	28.967	8.2	−44.2	.811	−2.1	−9.1	219, 220		Pressure rising and then falling.
37	Sept. 8, 1929, 12h.	Sept. 13, 1929, 13h	121	29.041	±1.24	.6	6.0	S.	−58.5	28.967	8.2	−44.2	.074	−2.2	−14.3	221, 222, 223, 224, 225, 226.		Pressure falling and then rising.
38	Sept. 14, 1929, 5h.	Sept. 15, 1929, 4h.	23	29.410	±.29	.7	5.4	E.	−53.4	28.967	8.2	−44.2	.443	−2.8	−9.2	227		Pressure rising and then falling.
39	Sept. 19, 1929, 12h	Sept. 20, 1929, 1h.	13	28.521	.28	1.6	11.9	W.	−33.6	28.967	8.2	−44.2	−.486	3.5	10.6	233		Pressure rising.
40	Sept. 26, 1929, 23h	Sept. 30, 1929, 5h.	78	28.694	−.31	.2	5.2	S.	−52.9	28.967	8.2	−44.2	−.273	−3.0	−8.7	239, 240, 241, 242, 243		Pressure falling.
41	Oct. 3, 1929, 11h.	Oct. 4, 1929, 24h.	37	28.723	−.23	.1	5.7	W.	−45.3	28.881	9.1	−17.7	−.158	−3.4	−28.0	249, 250, 251		Do.
42	Oct. 12, 1929, 17h.	Oct. 13, 1929, 7h.	14	29.024	.02	.4	7.1	E.	−36.5	28.881	9.1	−17.7	.143	−2.0	−18.8	262		Pressure rising.
43	Oct. 13, 1929, 11h.	Oct. 14, 1929, 16h.	29	28.915	.06	.8	5.2	S.	−34.5	28.881	9.1	−17.7	.034	−3.9	−16.8	264, 265		Pressure steady.

TABLE 56.—*Periods with "clear" sky at Little America*—Continued

Number of period	Date		(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	From—	To—	Length of period (hours)	Mean pressure during period sea level (inches)	Pressure change during period (inch)	Mean cloudiness during period (0–10)	Mean velocity during period (m. p. h.)	Prevailing wind direction during period	Mean temperature during period (°F)	Mean pressure for month sea level (inches)	Mean velocity for month (m. p. h.)	Mean temperature for month (°F)	(1–7) (inch)	(4–8) (m. p. h.)	(6–9) (°F)	Pilot-balloon ascents during period (No.)	Kite and airplane ascents during period (No.)	Type of pressure change during period
44	Oct. 15, 1929, 12h.	Oct. 16, 1929, 18h.	30	29.085	−.28	1.5	5.1	S.	−21.7	28.881	9.1	−17.7	.206	−4.0	−4.0	267, 268		Pressure falling.
45	Oct. 21, 1929, 13h.	Oct. 22, 1929, 5h.	16	29.078	−.16	.8	10.9	S.	−14.4	28.881	9.1	−17.7	.177	1.8	3.3		15	Do.
46	Oct. 25, 1929, 6h.	Oct. 26, 1929, 7h.	25	29.093	−.11	1.2	3.7	SW.	−19.2	28.881	9.1	−17.7	.212	−5.4	−1.5	277, 278		Do.
47	Oct. 28, 1929, 22h.	Oct. 29, 1929, 22h.	24	28.787	.02	3.8	4.8	W.	−10.0	28.881	9.1	−17.7	−.094	−4.3	7.7	284, 285		Pressure steady.
48	Nov. 13, 1929, 4h.	Nov. 14, 1929, 7h.	27	29.220	.19	.1	7.3	E.	−8.0	29.391	9.2	1.7	−17.1	−1.9	−9.7	301, 302		Pressure rising.
49	Nov. 15, 1929, 7h.	Nov. 20, 1929, 19h.	132	29.579	±.92	.1	8.6	E.	.1	29.391	9.2	1.7	.188	−.6	−1.6	304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316.	28, 13A	Pressure rising and then falling.
50	Nov. 23, 1929, 5h.	Nov. 23, 1929, 24h.	19	30.011	.15	.6	4.8	E.	8.1	29.391	9.2	1.7		−4.4	6.4	320, 321	13B	Pressure rising.
51	Nov. 28, 1929, 22h.	Nov. 29, 1929, 13h.	15	29.502	−.14	.4	4.9	E.	6.8	29.391	9.2	1.7	.111	−4.3	5.1	331, 332	33, 35	Pressure falling.
52	Nov. 30, 1929, 7h.	Dec. 3, 1929, 11h.	76	29.355	−.15	.9	6.7	S.	8.0	29.604	8.6	9.3	−.249	−1.9	1.6	334, 335, 336, 337	36	Pressure steady.
53	Dec. 4, 1929, 6h.	Dec. 5, 1929, 17h.	35	29.702	.29	1.9	6.4	SW.	17.1	29.604	8.6	9.3	.098	−2.2	7.8	340, 341, 342	48	Pressure rising.
54	Dec. 5, 1929, 24h.	Dec. 6, 1929, 12h.	12	29.722	−.07	.4	3.0	SW.	14.8	29.604	8.6	9.3	.118	−5.6	5.5	344		Pressure falling.
55	Dec. 7, 1929, 6h.	Dec. 8, 1929, 4h.	22	29.605	−.12	1.0	6.3	W.	13.3	29.604	8.6	9.3	.001	−2.3	4.0		49A	Do.
56	Dec. 19, 1929, 16h.	Dec. 20, 1929, 8h.	16	29.800	−.10	.3	13.4	E.	23.2	29.604	8.6	9.3	.196	4.8	13.9	362	59	Do.
57	Jan. 21, 1930, 3h.	Jan. 23, 1930, 23h.	68	29.455	−.58	1.1	10.3	E.	14.3	29.253	9.7	19.3	.202	.6	−5.0	399, 400		Do.
58	Jan. 24, 1930, 17h.	Jan. 25, 1930, 24h.	31	29.125	.07	.4	6.4	W.	6.1	29.253	9.7	19.3	−.128	−3.3	−13.2			Pressure steady.
59	Jan. 26, 1930, 17h.	Jan. 27, 1930, 20h.	27	29.276	.17	.6	5.4	SW.	3.8	29.253	9.7	19.3	.023	−4.3	−15.5	405		Pressure rising.
60	Feb. 6, 1930, 7h.	Feb. 7, 1930, 8h.	25			.7			2.6	29.188						414		Pressure falling.
61	Feb. 9, 1930, 7h.	Feb. 9, 1930, 22h.	15			.1			12.2	29.188								Pressure rising and then falling.
62	Mar. 10, 1934, 9h.	Mar. 11, 1934, 4h.	19	29.326	.31	2.8	17.5	NE.	−1.5	29.220	14.3	−14.0	.106	3.2	12.5			Pressure rising.
63	Mar. 13, 1934, 10h.	Mar. 14, 1934, 6h.	20	29.062	.23	.3	7.6	SW.	−21.9	29.220	14.3	−14.0	−.158	−6.7	−7.9			Do.
64	Mar. 18, 1934, 13h.	Mar. 19, 1934, 15h.	26	29.538	.02	.7	22.1	E.	−14.2	29.220	14.3	−14.0	.318	7.8	−.2			Pressure steady.
65	Mar. 22, 1934, 3h.	Mar. 22, 1934, 23h.	20	29.098	.07	.3	8.6	W.	−40.0	29.220	14.3	−14.0	−.122	−5.7	−26.0			Do.
66	Mar. 27, 1934, 8h.	Mar. 28, 1934, 11h.	27	29.257	.02	.4	5.4	W.	−47.6	29.220	14.3	−14.0	.037	−8.9	−33.6			Do.
67	Mar. 29, 1934, 16h.	Mar. 30, 1934, 5h.	13	29.429	−.06	.4	8.5	W.	−38.1	29.220	14.3	−14.0	.209	−5.8	−24.1			Do.
68	Apr. 2, 1934, 10h.	Apr. 2, 1934, 23h.	13	29.131	±.36	1.8	6.9	W.	−32.4	28.981	14.3	−15.7	.150	−7.4	−16.7	422		Pressure rising and then falling
69	Apr. 12, 1934, 17h.	Apr. 13, 1934, 14h.	21	29.024	.14	1.4	4.7	S.	−39.4	28.981	14.3	−15.7	.043	−9.6	−23.7	447, 448, 449		Pressure steady.
70	Apr. 14, 1934, 6h.	Apr. 15, 1934, 1h.	19	29.087	−.03	Few	9.0	SE.	−34.2	28.981	14.3	−15.7	.106	−5.3	−18.5	451		Do.
71	Apr. 17, 1934, 6h.	Apr. 18, 1934, 23h.	41	29.123	.08	1.7	4.4	SW.	−45.6	28.981	14.3	−15.7	.142	−9.9	−29.9	459, 460, 461		Pressure rising.
72	Apr. 29, 1934, 22h.	Apr. 30, 1934, 23h.	25	29.048	−.11	Few	16.4	SW.	−16.0	28.981	14.3	−15.7	.067	2.1	−0.3	491, 492		Pressure steady.
73	May 4, 1934, 6h.	May 5, 1934, 14h.	32	29.479	±.24	.9	3.8	SW, S.	−43.6	29.068	12.1	−19.4	.411	−8.3	−24.2	499, 500, 501, 502, 503		Pressure falling and then rising.
74	May 5, 1934, 16h.	May 7, 1934, 4h.	36	29.435	−.31	.2	15.3	E.	−35.3	29.068	12.1	−19.4	.367	3.2	−15.9	505, 506, 507		Pressure falling.
75	May 7, 1934, 12h.	May 10, 1934, 20h.	80	29.037	−.13	.5	9.0	S.	−39.1	29.068	12.1	−19.4	−.031	−3.1	−19.7	508, 509, 510, 511, 512, 513, 514, 515, 516.		Pressure steady.
76	May 18, 1934, 13h.	May 22, 1934, 1h.	84	29.298	−.42, ±.96	.4	8.4	SW.	−49.0	29.068	12.1	−19.4	.230	−3.7	−29.6	531, 532, 533, 534, 535, 536, 537, 538, 539, 540.		Pressure falling followed by pressure rising and then falling.
77	June 5, 1934, 14h.	June 8, 1934, 2h.	60	29.095	−.50	0	11.4	SW.	−14.2	28.950	12.0	−13.7	.145	−0.6	−0.5	556, 557, 558, 559, 560, 561, 562.		Pressure falling.
78	June 11, 1934, 20h.	June 13, 1934, 15h.	43	29.227	−.39	.05	6.1	SW.	−23.3	28.950	12.0	−13.7	.277	−5.9	−9.6	567, 568		Do.
79	June 17, 1934, 12h.	June 18, 1934, 21h.	33	28.722	.13	0	8.0	SW.	−28.8	28.950	12.0	−13.7	.228	−4.0	−15.1	574, 575, 576, 577		Pressure rising.
80	June 27, 1934, 8h.	June 29, 1934, 22h.	62	29.469	.40	1.2	5.5	SW.	−46.2	28.950	12.0	−13.7	.519	−6.5	−32.5	588, 589, 590, 591, 592,	593, 594	Do.
81	June 30, 1934, 9h.	June 30, 1934, 21h.	12	29.652	−.03	.2	11.1	SW.	−36.1	28.950	12.0	−13.7	.702	−0.9	−22.4	595, 596		Pressure steady.
82	July 2, 1934, 8h.	July 3, 1934, 22h.	38	28.994	±.41	.5	4.4	SW.	−54.2	29.073	11.0	−37.1	−.079	−6.6	−17.1	600, 601, 602, 603		Pressure falling and then rising.
83	July 4, 1934, 8h.	July 4, 1934, 23h.	15	29.031	.04	.1	15.9	E.	−19.9	29.073	11.0	−37.1	−.042	4.9	17.2	604, 605		Pressure steady.
84	July 6, 1934, 8h.	July 8, 1934, 14h.	54	29.294	.36	.3	5.1	W.	−49.5	29.073	11.0	−37.1	.221	−5.9	−12.4	607, 608, 609, 610, 611		Pressure rising.
85	July 11, 1934, 6h.	July 14, 1934, 21h.	87	29.224	−.27, ±.48	0	9.7	W, SW.	−50.4	29.073	11.0	−37.1	.151	−1.3	−13.3	614, 615, 616, 617, 618, 619, 620.		Pressure falling followed by pressure rising and then falling.

86	July 16, 1934, 19h..	July 17, 1934, 17h..	22	28.470	.32	.7	9.0	SW.	−41.0	29.073	11.0	−37.1	−.397	−2.0	−3.9	623, 624, 625		Pressure rising.
87	July 18, 1934, 4h...	July 18, 1934, 23h..	19	28.586	.18	.4	6.5	W.	−37.8	29.073	11.0	−37.1	−.487	−4.5	−0.7	626		Do.
88	July 21, 1934, 2h...	July 22, 1934, 1h...	23	29.354	.62	.2	6.8	SW.	−68.4	29.073	11.0	−37.1	.281	−4.2	−31.3	633, 634		Do.
89	July 23, 1934, 1h...	July 23, 1934, 21h..	20	29.697	.54	2.1	6.6	S.	−52.7	29.073	11.0	−37.1	.624	−4.4	−15.6	636, 637		Do.
90	July 28, 1934, 10h..	July 31, 1934, 11h..	73	28.833	−.56	.01	5.3	SW.	−50.1	29.073	11.0	−37.1	−.240	−5.7	−13.0	641, 642, 643, 644, 645, 646.		Pressure falling.
91	Aug. 1, 1934, 6h...	Aug. 1, 1934, 18h..	12	28.294	−.23	.2	10.3	W.	−36.5	28.703	8.8	−38.6	−.409	1.5	2.1	648		Do.
92	Aug. 3, 1934, 16h..	Aug. 4, 1934, 9h...	17	28.868	±.16	.3	3.6	SW.	−34.9	28.703	8.8	−38.6	.165	−5.2	13.7	652, 653		Pressure rising and then falling.
93	Aug. 6, 1934, 17h..	Aug. 7, 1934, 23h..	30	28.772	−.14	.6	4.3	S.	−41.9	28.703	8.8	−38.6	.069	−4.5	−3.3	657, 658, 659		Pressure falling.
94	Aug. 10, 1934, 17h.	Aug. 11, 1934, 23h.	30	28.712	−.40	.1	9.0	SW.	−32.6	28.703	8.8	−38.6	.009	0.2	6.0	665, 666, 667		Do.
95	Aug. 12, 1934, 14h.	Aug. 13, 1934, 9h..	19	28.449	−.06	.8	9.2	W.	−49.8	28.703	8.8	−38.6	−.254	0.4	−11.2	669		Do.;
96	Aug. 17, 1934, 18h.	Aug. 18, 1934, 22h.	28	28.736	.40	.8	7.1	W.	−49.0	28.703	8.8	−38.6	.033	−1.7	−10.4	675		Pressure rising.
97	Aug. 19, 1934, 20h.	Aug. 21, 1934, 23h.	51	28.480	±.57	Few	3.7	W.	−58.9	28.703	8.8	−38.6	−.223	−5.1	−20.3	676, 677, 678, 679, 680.		Pressure falling and then rising.
98	Aug. 26, 1934, 18h.	Aug. 27, 1934, 23h.	29	28.096	±.73	Few	7.9	W.	−55.6	28.703	8.8	−38.6	−.607	−0.9	−17.0	684, 685		Do.
99	Aug. 29, 1934, 17h.	Aug. 31, 1934, 23h.	54	28.970	−.45	.03	5.2	S.	−60.9	28.703	8.8	−38.6	.267	−3.6	−22.3	688, 689, 690, 691		Pressure falling.
100	Sept. 6, 1934, 23h..	Sept. 8, 1934, 11h..	36	28.898	−.11	.4	5.9	W.	−49.7	28.829	11.5	−34.2	.069	−5.6	−15.5	704, 705, 706	6	Do.
101	Sept. 11, 1934, 13h.	Sept. 14, 1934, 23h.	82	28.846	−.54	.8	5.5	S.	−58.6	28.829	11.5	−34.2	.017	−6.0	−24.4	711, 712, 713, 714, 715, 716, 717, 718, 719.	8, 9	Do.
102	Sept. 16, 1934, 16h.	Sept. 18, 1934, 17h.	49	28.813	±.68	.03	5.8	S.	−54.2	28.829	11.5	−34.2	.016	−5.7	−20.0	721, 722, 723	11, 12	Pressure falling and then rising.
103	Oct. 1, 1934, 3h....	Oct. 3, 1934, 5h....	50	29.038	±.35	.7	7.3	S.	−36.8	28.654	13.4	−14.3	.384	−6.1	−22.5	739, 740, 741		Pressure rising and then falling.
104	Oct. 22, 1934, 5h...	Oct. 23, 1934, 11h..	30	28.795	.06	.6	11.3	W.	−25.2	28.654	13.4	−14.3	.141	−2.1	−10.9	764, 765, 766, 767	16	Pressure rising.
105	Oct. 26, 1934, 5h...	Oct. 28, 1934, 1h...	444	28.972	.50	.1	7.2	SW.	−30.5	28.654	13.4	−14.3	.318	−6.2	−16.2	775, 776, 777		Do.
106	Nov. 1, 1934, 1h...	Nov. 1, 1934, 17h..	16	28.546	.02	3.0	9.1	S.	−25.5	28.736	11.2	−2.0	−.190	−2.1	−23.5	783, 784		Pressure steady.
107	Nov. 10, 1934, 18h.	Nov. 12, 1934, 13h.	43	28.558	.56	.1	11.6	SW.	−13.3	28.736	11.2	−2.0	−.178	.4	−11.3	806, 907, 808, 809, 810, 811.		Pressure falling.
108	Nov. 15, 1934, 4h..	Nov. 17, 1934, 10h.	54	28.505	−.28	.03	7.8	S.	−11.4	28.736	11.2	−2.0	−.231	−3.4	−9.4	817, 818, 719, 820, 821, 822, 823.	41, 42	Do.
109	Nov. 18, 1934, 5h..	Nov. 19, 1934, 9h..	28	28.562	−.13	.7	6.9	S, SW.	−4.6	28.736	11.2	−2.0	−.174	−4.3	−2.6	825, 826, 827, 828, 829.		Pressure steady.
110	Nov. 21, 1934, 6h..	Nov. 22, 1934, 13h.	31	28.917	−.23	.2	10.3	S.	1.4	28.736	11.2	−2.0	.181	−.9	3.4	831, 832, 833, 834, 835, 836.		Pressure falling.
111	Nov. 23, 1934, 2h..	Nov. 24, 1934, 12h.	34	28.706	−.16	.2	6.6	SW.	−1.2	28.736	11.2	−2.0	−.030	−4.6	.	839, 840, 841		Do.
112	Dec. 7, 1934, 3h....	Dec. 9, 1934, 1h....	46	29.295	−.25	Few	8.8	S.	9.3	29.118	8.9	17.2	.177	−.1	−7.9	867, 867, 869, 870, 871, 872, 873.	62, 63, 64	Do.
113	Dec. 11, 1934, 4h..	Dec. 12, 1934, 1h..	21	29.355	.06	Few	6.7	S.	14.9	29.118	8.9	17.2	.237	−2.2	−2.3	878, 879, 880, 881		Pressure steady.
114	Dec. 23, 1934, 5h..	Dec. 23, 1934, 20h.	15	29.264	.25	Few	15.3	SW.	18.5	29.118	8.9	17.2	.146	6.4	1.3	906, 907, 908		Pressure rising.
115	Dec. 27, 1934, 20h.	Dec. 29, 1934, 20h.	48	28.958	.19	.5	10.3	E.	21.0	29.118	8.9	17.2	−.160	1.4	3.8	914, 915, 916, 917, 918.	70, 71	Do.
116	Dec. 30, 1934, 4h..	Dec. 31, 1934, 19h.	39	29.003	−.10	.3	9.2	S.	22.6	29.118	8.9	17.2	−.115	.3	5.4	920, 921, 922		Pressure falling.
117	Jan. 1, 1935, 4h....	Jan. 2, 1935, 6h....	26	29.088	.54	Few	13.0	E.	24.1	29.487	11.8	24.1	−.399	1.2	0	925, 926	74	Pressure rising.
118	Jan. 5, 1935, 1h....	Jan. 7, 1935, 1h....	48	29.633	.14	Few	12.8	S.	20.3	29.487	11.8	24.1	.146	1.0	−3.8	935, 936, 937, 938, 939, 940, 941.	76, 77	Pressure steady.
119	Jan. 9, 1935, 9h....	Jan. 9, 1935, 23h...	14	29.460	±.10	Few	1.1	SW.	19.6	29.487	11.8	24.1	−.027	−0.7	−4.5	947, 948	80	Pressure falling and then rising.

[1] Only 9 days of hourly cloud observations in February 1930 and only 5 days record of the other elements.

TABLE 57.—*Average and maximum length of the "clear" periods and mean cloudiness during the "clear" periods by months and seasons*

Month	Number of clear periods	Total hours of clear periods	Average length of clear periods	Mean cloudiness during clear periods (0–10)	Mean cloudiness for month (0–10)	Maximum hours of continuous clear weather	Mean cloudiness during maximum clear period (0–10)
		Hours	*Hours*		*Hours*		
January 1929	3	67	22.3	0.4	7.4	29	1.5
February 1929	1	42	42.0	.2	7.5	42	.2
March 1929	1	25	25.0	1.2	8.2	25	1.2
April 1929	6	128	21.3	.7	5.7	41	.6
May 1929	4	182	45.5	.6	6.0	81	.7
June 1929	4	121	30.2	.5	6.4	68	.3
July 1929	7	420	60.0	.8	3.5	167	1.1
August 1929	8	207	25.9	.4	5.7	95	.4
September 1929	7	324	46.3	.8	4.4	121	.6
October 1929	7	175	25.0	1.2	6.4	37	.1
November 1929	5	211	42.2	.2	5.4	132	.1
December 1929	5	143	28.6	1.0	6.4	76	.9
January 1930	3	126	42.0	.8	7.1	68	1.1
February 1930 [1]	2	40	20.0	.5	6.1	25	.7
March 1934	6	125	20.8	.8	6.8	27	.4
April 1934	5	119	23.8	1.1	7.7	41	1.7
May 1934	5	232	46.4	.5	5.5	84	.4
June 1934	5	210	42.0	.4	5.7	62	1.2
July 1934	9	351	39.0	.3	4.2	87	.0
August 1934	9	270	30.0	.2	4.7	54	.03
September 1934	3	167	55.7	.6	5.7	82	.8
October 1934	3	124	41.3	.4	7.1	50	.7
November 1934	6	206	34.3	.4	6.3	54	.03
December 1934	5	169	33.8	.2	5.9	48	.5
January 1935	3	88	29.3	Few	7.7	48	Few
COMBINED DATA, 1929 AND 1934							
Summer	22	675	30.7	.6	6.9	76	.9
Autumn	27	811	30.0	.7	6.5	84	.4
Winter	42	1,581	37.6	.5	5.1	167	1.1
Spring	31	1,217	39.3	.7	5.7	132	.1

[1] Only 9 days of hourly cloud observation in February 1930.

TABLE 58.—*Mean monthly pressure, temperature, and wind velocity during "clear" periods and departure from the monthly mean values*

Month	(1) Mean pressure during clear periods	(2) Mean pressure for month	(3) 1-2	(4) Mean temperature during clear periods	(5) Mean temperature for month	(6) 4-5	(7) Mean velocity during clear periods	(8) Mean velocity for month	(9) 7-8
	Inches	*Inches*	*Inches*	°*F.*	°*F.*	°*F.*	*M. p. h.*	*M. p. h.*	*M. p. h.*
January 1929	29.345	29.419	−0.074	11.5	21.1	−9.6	8.9	9.5	−0.6
February 1929	29.104	29.197	−.093	−4.2	11.0	−15.2	9.3	11.1	−1.8
March 1929	28.962	29.190	−.228	−32.6	−5.0	−27.6	6.1	12.9	−6.8
April 1929	29.128	29.270	−.142	−35.5	−29.7	−5.8	5.5	8.4	−2.9
May 1929	28.977	28.908	.069	−40.5	−22.7	−17.8	5.2	8.8	−3.1
June 1929	29.124	29.308	−.184	−35.0	−10.6	−24.4	6.0	10.1	−4.6
July 1929	29.040	28.967	.073	−55.6	−45.8	−9.8	6.1	7.9	−1.8
August 1929	29.029	29.093	−.064	−49.5	−28.0	−21.5	4.3	8.9	−4.6
September 1929	29.039	28.967	.072	−55.0	−44.2	−10.8	5.6	8.2	−2.6
October 1929	28.935	28.881	.054	−32.2	−17.7	−14.5	5.7	9.1	−3.4
November 1929	29.565	29.391	.174	1.4	1.7	−.3	8.2	9.2	−1.0
December 1929	29.536	29.604	−.068	12.5	9.3	3.2	6.4	8.6	−2.2
January 1930	29.335	29.253	.082	10.0	19.3	−9.2	8.3	9.7	−1.4
March 1934	29.287	29.220	.067	−27.3	−14.0	−13.3	11.9	14.3	−2.4
April 1934	29.085	28.981	.104	−35.0	−15.7	−19.3	8.0	14.3	−6.3
May 1934	29.254	29.068	−.186	−42.7	−19.4	−23.3	9.1	12.1	−3.0
June 1934	29.206	28.950	.256	−29.2	−13.7	−15.5	8.0	12.0	−4.0
July 1934	29.074	29.073	.001	−49.3	−37.1	−12.2	7.2	11.0	−3.8
August 1934	28.636	28.703	−.067	−49.3	−38.6	−15.1	6.2	8.8	−2.6
September 1934	28.848	28.829	.019	−55.4	−34.2	−21.2	5.6	11.5	−5.9
October 1934	28.956	28.654	.302	−31.8	−14.3	−17.5	8.2	13.4	−5.2
November 1934	28.622	28.736	−.114	−8.3	−2.0	−6.3	8.8	11.2	−2.4
December 1934	29.137	29.118	.019	17.2	17.2	0	9.6	8.9	.7
January 1935	29.444	29.487	−.043	21.3	24.1	−2.8	12.6	11.8	.8
COMBINED DATA, 1929 AND 1934									
Summer	29.334	29.346	−.012	12.8	16.2	−3.4	8.8	10.2	−1.4
Autumn	29.143	29.106	.037	−37.3	−17.7	−19.6	7.8	11.8	−4.0
Winter	29.005	29.015	−.010	−47.3	−29.2	−18.1	6.4	9.8	−3.4
Spring	29.002	28.908	.094	−32.8	−18.4	−14.4	6.8	10.4	−3.6
Year	29.086	29.099	−.013	-------	−12.8	-------	-------	10.5	-------

TABLE 59.—*Number of cases of prevailing surface wind with the different directions during clear periods.—Combined data, 1929 and 1934*

Season	North	Northeast	East	Southeast	South	Southwest	West	Northwest
Summer	0	1	6	0	7	6	2	0
Autumn	0	1	3	1	8	10	4	0
Winter	0	0	3	0	9	20	10	0
Spring	0	0	6	0	13	6	6	0

TABLE 60.—*Probability of a clear period of at least 24-hours duration, combined data, 1929 and 1934*

	January	February	March	April	May	June	July	August	September	October	November	December
Probability	*Percent* 67	*Percent* 63	*Percent* 43	*Percent* 36	*Percent* 88	*Percent* 56	*Percent* 56	*Percent* 44	*Percent* 80	*Percent* 80	*Percent* 70	*Percent* 50

TABLE 61.—*Pressure changes during clear periods*

	Type of pressure change				
	Pressure rising	Pressure falling	Pressure steady	Pressure rising and then falling	Pressure falling and then rising
Number of period	2, 6, 10, 24, 26, 30, 31, 35, 39, 42, 48, 50, 53, 59, 62, 63, 71, 79, 80, 84, 86, 87, 88, 89, 96, 104, 105, 114, 115, 117.	1, 3, 5, 8, 11, 12, 13, 18, 20, 27, 28, 29, 40, 41, 44, 45, 46, 51, 54, 55, 56, 57, 60, 74, 76 (Part), 77, 78, 85 (Part), 90, 91, 93, 94, 95, 99, 100, 101, 107, 108, 110, 111, 112, 116.	4, 7, 15, 17, 19, 23, 25, 33, 43, 47, 52, 58, 64, 65, 66, 67, 69, 70, 72, 75, 81, 83, 106, 109, 113, 118.	9, 14, 21, 22, 36, 38, 49, 61, 68, 76 (Part), 85 (Part), 92, 103.	16, 32, 34, 37, 73, 82, 97, 98, 102, 119.
Number of cases	30	42	26	12	10.
Maximum length of clear period.	54 hours, No. 84	82 hours, No. 101	80 hours, No. 75	167 hours, No. 22	121 hours, No. 37.
Average length of clear period.	27.3 hours	34.5 hours	28.7 hours	59.1 hours	58.2 hours.
Average pressure change during clear periods.	0.273 inch	−0.248 inch	0.062 inch [2]	0.570 inch [1]	0.662 inch.[1]
Average departure of the mean pressure during clear periods from the monthly mean.	0.033 inch	0.049 inch	0.126 inch	0.215 inch	−0.115 inch.

[1] Obtained by adding the amount of pressure rise and the amount of pressure fall without sign, thus giving average total variation.
[2] Mean obtained without regard to sign, thus giving average total variation.

TABLE 62.—*Results of pilot-balloon ascents during "clear" periods at Little America, by seasons and year, combined data, 1929 and 1934*

SUMMER

Altitude (m.)	Number of observations	N.-S. component (m. p. s.)	E.-W. component (m. p. s.)	Resultant direction (from)	Resultant velocity (m. p. s.)	Mean velocity (m. p. s.)	Stability (percent)	Mean direction (from)
11,000	3	−0.10	−4.23	S. 89° E.	4.23	6.00	70	S. 73° E.
10,000	7	3.27	−3.27	N. 45° E.	4.63	7.14	65	N. 57° E.
9,000	11	4.40	−2.08	N. 25° E.	4.86	10.09	48	N. 29° E.
8,000	20	2.13	2.90	N. 54° W.	3.60	15.85	21	N. 57° E.
7,000	30	.31	2.36	N. 82° W.	2.38	15.37	16	S. 80° E.
6,000	38	−.23	−.02	S. 5° E.	.23	11.55	2	S. 64° E.
5,000	43	−.79	−1.49	S. 62° E.	1.69	9.53	18	S. 59° E.
4,000	46	−1.69	−1.33	S. 38° E.	2.15	7.61	28	S. 46° E.
3,000	51	−2.03	−1.87	S. 43° E.	2.76	6.90	40	S. 42° E.
2,000	53	−3.35	−2.04	S. 31° E.	3.91	6.72	58	S. 28° E.
1,000	53	−3.87	−1.61	S. 23° E.	4.19	5.94	70	S. 26° E.
Surface	53	−2.67	−.85	S. 18° E.	2.80	4.23	66	S. 12° E.

AUTUMN

9,000	5	−1.14	2.26	S. 63° W.	2.53	14.60	17	N. 30° E.
8,000	9	.10	2.19	N. 87° W.	2.19	12.00	18	N. 40° E.
7,000	15	2.43	.30	N. 7° W.	2.45	9.67	25	N. 7° E.
6,000	21	2.25	.33	N. 8° W.	2.28	9.47	24	N. 8° E.
5,000	31	.90	.15	N. 10° W.	.91	7.00	13	N. 34° E.
4,000	42	−1.19	−.05	S. 2° E.	1.19	7.00	17	S. 34° E.
3,000	50	−3.04	−.26	S. 5° E.	3.05	6.96	44	S. 14° E.
2,000	58	−4.83	−.01	S. 5° S.	4.85	7.46	65	S. 7° E.
1,000	62	−5.11	−1.24	S. 15° E.	5.25	7.61	69	S. 11° E.
Surface	64	−1.91	−.16	S. 5° E.	1.92	3.00	64	S. 3° W.

WINTER

8,000	2	7.65	−0.7	N. 6° E.	7.68	12.00	64	N. 45° W.
7,000	7	6.96	9.33	N. 53° W.	11.65	14.71	79	N. 52° W.
6,000	16	1.66	7.41	N. 77° W.	7.60	12.06	63	N. 89° W.
5,000	32	−.45	4.09	S. 84° W.	4.11	8.84	46	S. 89° W.
4,000	51	−.42	2.29	S. 80° W.	2.33	8.88	26	S. 73° W.
3,000	84	−1.56	2.11	S. 54° W.	2.65	8.25	32	S. 52° W.
2,000	94	−2.76	1.32	S. 26° W.	3.06	7.47	41	S. 29° W.
1,000	109	−5.01	1.39	S. 16° W.	5.20	8.04	65	S. 13° W.
Surface	113	−1.66	.54	S. 18° W.	1.75	2.73	64	S. 18° W.

SPRING

11,000	2	5.55	7.20	N. 52° W.	9.09	15.5	59	N. 34° W.
10,000	10	.81	.99	N. 51° W.	1.28	9.7	13	N. 28° E.
9,000	22	.11	.05	N. 24° W.	.12	12.27	1	N. 72° E.
8,000	37	−.14	3.05	S. 88° W.	3.05	13.49	23	N. 5° E.
7,000	45	−.43	3.74	S. 83° W.	3.76	12.44	31	S. 70° W.
6,000	56	−1.94	2.31	S. 50° W.	3.02	11.75	26	S. 10° W.
5,000	68	−3.60	1.43	S. 22° W.	3.87	11.10	35	S.
4,000	78	−4.06	.72	S. 10° W.	4.13	9.47	44	S. 3° W.
3,000	91	−4.09	1.18	S. 16° W.	4.25	8.01	53	S. 12° W.
2,000	103	−4.89	1.49	S. 17° W.	5.11	7.91	65	S. 9° W.
1,000	103	−5.13	1.94	S. 21° W.	5.48	7.85	70	S. 10° W.
Surface	105	−1.93	.67	S. 19° W.	2.08	3.20	64	S. 18° W.

YEAR

11,000	5	2.16	0.34	N. 9° W.	2.19	9.80	22	N. 78° E.
10,000	18	2.94	−.72	N. 14° E.	3.03	9.39	32	N. 43° E.
9,000	39	1.85	−.55	N. 17° E.	1.93	12.38	16	N. 32° E.
8,000	68	.78	2.78	N. 74° W.	2.89	13.95	21	N. 30° E.
7,000	97	.77	3.19	N. 76° W.	3.28	13.08	25	N. 10° E.
6,000	131	−.33	1.95	S. 80° W.	1.98	11.37	17	S. 53° W.
5,000	174	−1.53	.98	S. 33° W.	1.81	9.64	19	S. 16° E.
4,000	217	−2.15	.51	S. 13° W.	2.21	8.46	26	S. 9° W.
3,000	276	−2.75	.64	S. 13° W.	2.82	7.69	37	S. 2° W.
2,000	308	−3.96	.55	S. 8° W.	4.00	7.48	53	S. 6° W.
1,000	327	−4.88	.58	S. 7° W.	4.91	7.54	65	S.
Surface	335	−1.95	.23	S. 7° W.	1.97	3.20	62	S. 9° W.

TABLE 63.—*Percentage frequency of the different wind directions at the standard levels during "clear" periods by seasons and year; combined data, 1929 and 1934*

SUMMER, COMBINED DATA

Altitude (m.)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Number of observations
10,000	21.5	42.9	14.3	14.3	0	0	0	7.1	0	7
9,000	31.8	22.8	13.6	13.7	0	0	9.1	9.1	0	11
8,000	7.5	20.0	25.0	12.5	2.5	7.5	12.5	12.5	0	20
7,000	5.1	11.6	26.7	18.3	3.3	10.0	15.0	10.0	0	30
6,000	5.3	10.5	25.0	17.1	3.9	13.2	15.8	9.2	0	38
5,000	5.8	10.6	23.2	20.9	9.3	9.3	12.8	8.2	0	43
4,000	3.3	6.5	25.0	22.9	11.9	10.8	8.7	10.8	0	46
3,000	2.0	4.9	23.5	27.4	12.7	11.8	5.9	11.8	0	51
2,000	1.0	6.6	19.8	24.5	28.3	13.2	5.7	.9	0	53
1,000	0	5.6	13.2	32.1	34.9	11.3	3.8	1.0	0	53
Surface	0	0	22.6	13.2	38.6	21.7	1.9	0	1.9	53

AUTUMN, COMBINED DATA

9,000	40.0	20.0	10.0	10.0	0	20.0	0	0	0	5
8,000	33.3	11.1	16.6	5.6	11.1	16.6	5.6	0	0	9
7,000	40.0	16.7	13.4	3.4	0	10.0	10.1	6.6	0	15
6,000	21.4	21.4	14.3	7.2	0	9.5	16.7	9.6	0	21
5,000	11.2	20.9	14.6	14.5	0	14.2	14.5	9.7	0	31
4,000	10.6	13.1	15.5	15.6	13.0	16.6	13.1	2.4	0	42
3,000	3.0	10.0	13.0	18.0	16.0	28.0	6.0	1.0	0	50
2,000	.9	3.4	7.7	25.0	34.5	18.1	6.8	1.7	1.7	58
1,000	1.6	2.4	8.8	31.5	29.8	17.8	7.3	.8	0	62
Surface	0	.8	13.2	14.9	28.9	33.6	3.9	0	4.7	64

WINTER, COMBINED DATA

7,000	21.4	7.2	0	0	14.3	14.3	7.1	35.8	0	7
6,000	21.9	9.3	0	0	6.2	21.9	21.9	18.8	0	16
5,000	14.1	7.7	4.7	1.5	15.7	18.8	23.4	14.0	0	32
4,000	8.8	9.8	11.7	7.8	13.7	14.7	20.6	12.7	0	51
3,000	9.0	4.2	7.2	13.6	13.7	21.4	17.2	13.7	0	84
2,000	6.4	3.7	9.6	12.3	20.2	25.0	13.2	9.6	0	94
1,000	2.7	.9	6.9	18.8	29.8	23.0	14.3	3.7	0	109
Surface	0	2.2	9.3	11.4	21.7	38.0	6.2	.5	10.6	113

SPRING, COMBINED DATA

10,000	10.0	10.0	30.0	10.0	0	5.0	20.0	15.0	0	10
9,000	15.9	6.7	22.7	20.5	2.2	9.0	11.3	11.3	0	22
8,000	6.8	8.1	25.6	12.2	1.3	10.8	20.3	14.8	0	37
7,000	4.4	9.9	16.7	15.6	3.3	14.5	19.9	15.6	0	45
6,000	4.5	9.8	16.9	16.1	7.2	16.0	15.2	14.3	0	56
5,000	5.2	7.3	12.5	21.3	14.0	17.0	15.5	7.3	0	68
4,000	1.3	4.5	14.7	21.1	16.7	18.0	18.0	5.8	0	78
3,000	1.1	4.9	12.1	15.4	22.0	22.6	14.8	6.1	1.1	91
2,000	.5	2.9	10.7	19.9	22.4	26.4	14.1	2.5	1.0	103
1,000	1.0	1.9	8.3	19.0	28.1	27.5	8.9	2.0	0	103
Surface	.5	.5	10.9	10.0	23.9	36.2	10.0	.5	7.6	105

YEAR, COMBINED DATA

10,000	19.4	22.3	22.2	11.1	0	2.8	11.2	11.2	0	18
9,000	24.4	14.2	17.9	16.7	1.3	7.7	8.9	9.0	0	39
8,000	11.0	12.5	23.5	11.1	2.9	11.1	16.2	11.7	0	68
7,000	11.4	11.4	18.0	13.4	3.5	12.3	16.0	13.9	0	97
6,000	9.5	11.8	18.3	14.4	5.0	14.9	16.4	12.6	0	131
5,000	8.0	10.5	14.1	16.4	10.6	15.0	16.1	9.2	0	174
4,000	5.4	7.9	16.3	17.4	14.3	15.5	15.7	7.8	0	217
3,000	4.0	5.6	12.9	18.5	16.7	21.2	12.3	8.6	.4	276
2,000	2.5	3.9	11.3	19.3	24.8	22.3	11.0	4.1	.6	308
1,000	1.5	2.3	8.8	23.4	30.4	21.4	10.6	1.9	0	327
Surface	.1	2.1	12.7	12.0	26.4	34.0	6.7	.3	7.2	335

TABLE 63A.—*Mean velocity with the different wind directions at the standard levels during "clear" periods by seasons and year; combined data, 1929 and 1934*

SUMMER, COMBINED DATA

Altitude meters	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Number of observations
10,000	8.0	6.3	5.0	10.0				8.0	7
9,000	8.7	11.0	9.3	9.3			15.0	10.0	11
8,000	10.7	8.1	11.6	9.8	14.0	18.7	35.2	25.2	20
7,000	18.7	11.3	10.3	9.1	13.5	20.2	28.0	20.5	3
6,000	14.2	10.9	10.3	9.4	13.0	11.2	15.9	12.3	38
5,000	10.6	10.4	10.0	8.0	7.2	10.5	10.8	9.7	43
4,000	8.0	7.5	7.7	6.3	8.5	9.0	8.9	6.6	46
3,000	7.0	7.4	7.6	6.4	7.0	8.3	5.7	5.5	51
2,000	5.0	7.6	7.8	6.4	6.8	7.0	4.7	5.0	53
1,000		5.2	5.4	6.0	5.9	6.8	7.0		53
Surface			5.0	4.5	4.0	4.1	3.5		53

AUTUMN, COMBINED DATA

9,000	10.5	4.0	12.0	12.0		36.0			5
8,000	10.2	6.5	9.3	4.0	4.0	27.3	20.0		9
7,000	6.2	9.2	12.2	5.0		19.0	17.0		15
6,000	5.4	12.3	7.3	6.3	14.0	13.7	5.8		21
5,000	6.7	8.8	5.8	4.4		10.2	10.0	4.3	31
4,000	6.3	7.7	4.6	6.8	7.5	7.6	8.6	7.0	42
3,000	5.0	6.7	6.5	5.9	7.3	7.6	8.2		50
2,000	7.0	9.8	6.3	6.3	7.6	10.0	7.4	4.0	58
1,000	5.5	7.0	7.3	8.1	7.9	8.0	4.6	6.0	62
Surface		5.0	4.2	3.4	2.8	2.9	2.8		64

WINTER, COMBINED DATA

7,000	7.3	10.0			2.0	8.0	41.0	22.6	7
6,000	6.4	9.7			9.0	8.7	23.0	36.0	16
5,000	6.4	6.6	10.0		7.9	9.8	11.5	8.3	32
4,000	10.6	5.8	7.7	7.6	8.4	9.8	9.9	9.8	51
3,000	9.3	6.7	7.4	8.1	8.1	8.8	8.8	7.2	84
2,000	7.6	4.3	7.3	8.2	7.6	8.3	6.6	6.6	94
1,000	5.2	9.5	6.5	6.9	8.4	10.6	6.5	5.1	109
Surface		6.2	3.0	2.2	2.9	3.3	2.8	2.0	113

SPRING, COMBINED DATA

10,000	8.0	1.0	11.0	4.0			31.6	9.0	10
9,000	10.0	14.7	9.7	9.0		22.2	15.0	12.8	22
8,000	8.2	8.0	10.0	12.2		18.0	20.5	13.2	37
7,000	8.0	9.7	8.4	10.1		13.8	20.6	12.3	45
6,000	8.8	7.5	9.0	10.6	10.9	15.3	18.3	9.8	56
5,000	5.9	7.9	9.3	6.9	10.1	14.4	14.7	9.9	68
4,000	6.5	7.1	7.8	9.7	10.5	12.0	9.7	6.8	78
3,000	2.0	4.7	7.4	7.3	9.1	9.7	8.7	4.5	91
2,000	1.0	3.7	6.1	6.2	9.1	10.6	7.0	4.2	103
1,000	3.0	4.8	3.9	5.6	8.0	9.3	8.6	8.2	103
Surface	3.0	3.0	4.6	2.9	3.1	3.6	4.2	1.0	105

YEAR, COMBINED DATA

10,000	12.0	5.0	9.5	7.0		20.0	31.8	8.8	18
9,000	10.6	12.4	9.8	9.3	20.0	26.8	15.0	12.0	39
8,000	10.1	8.5	10.4	10.9	8.8	19.2	23.2	16.9	68
7,000	8.0	10.1	9.7	9.5	7.3	15.6	7.2	12.2	97
6,000	7.8	10.0	9.3	9.4	11.1	12.9	17.6	10.2	131
5,000	7.1	8.7	9.0	8.5	8.9	12.0	12.3	8.4	174
4,000	8.2	7.0	7.2	8.0	8.7	10.1	9.5	7.9	217
3,000	8.0	6.3	7.3	6.9	8.3	8.8	8.4	6.2	276
2,000	6.9	6.0	6.8	6.7	7.9	9.3	6.7	5.9	308
1,000	4.8	6.0	5.6	6.7	8.0	9.4	7.1	6.2	327
Surface	3.0	5.6	4.2	3.1	3.2	3.4	3.5	1.5	335

TABLE 64.—*Mean turning of the wind from the surface up to given levels during "clear" periods, combined data, 1929 and 1934*

Altitude (m.)	Summer		Autumn		Winter		Spring		Year	
	Turning	Number of observations	Turning	Number of observations	Turning	Number of observations	Turning	Number of observations	Turning	Number of observations
	Degrees		*Degrees*		*Degrees*		*Degrees*		*Degrees*	
11,070							5.2	2	−2.6	2
9,990	19.8	4					7.2	7	−.6	11
9,090	18.6	7	−77.7	4	16.8	1	−.2	12	−5.8	24
8,010	23.6	16	−78.5	8	16.8	2	−.5	27	−4.6	53
6,930	24.0	23	−59.0	10	3.8	3	.7	35	−1.4	71
6,030	23.2	35	−48.6	16	5.8	15	−1.0	42	−.9	108
4,950	21.6	41	−47.4	27	12.7	30	−3.6	57	−1.3	155
4,050	21.4	42	−34.4	37	11.0	46	−10.8	63	−2.0	188
2,970	10.4	47	−29.4	45	11.2	78	−10.7	77	−3.4	247
2,070	−9.6	48	−23.7	54	2.0	86	−10.7	89	−9.1	277
990	−13.1	47	−18.6	61	−4.6	96	−10.0	92	−10.5	296
Surface	.0	47	.0	61	.0	96	.0	92	.0	296

NOTE.—Cases with surface wind calm have been excluded in the computation.
Clockwise turning is positive; counterclockwise turning is negative.

TABLE 65.—*Results of pilot-balloon ascents during "clear" periods when the pressure was rising, combined data, 1929 and 1934*

Altitude (m.)	Number of observations	N–S component (m. p. s.)	E–W component (m. p. s.)	Resultant direction from—	Mean direction from—	Resultant velocity (m. p. s.)	Mean velocity (m. p. s.)	Stability (percent)
10,000	6	5.67	−3.67	N. 33° E.	N. 40° E.	6.72	10.67	63
9,000	9	3.80	−2.09	N. 29° E.	N. 39° E.	4.32	15.00	29
8,000	12	1.90	−3.87	N. 64° E.	N. 54° E.	4.30	13.83	31
7,000	14	2.36	−3.65	N. 57° E.	N. 58° E.	4.32	10.93	40
6,000	20	1.16	−1.16	N. 45° E.	N. 57° E.	1.64	11.05	15
5,000	30	−.07	.60	S. 84° W.	S. 65° E.	.60	9.63	6
4,000	45	−.33	.84	S. 68° W.	N. 48° E.	.88	7.98	11
3,000	52	−1.13	1.48	S. 52° W.	S. 24° W.	1.86	8.68	21
2,000	57	−1.83	2.05	S. 48° W.	S. 40° W.	2.35	8.05	29
1,000	59	−3.31	2.63	S. 38° W.	S. 32° W.	4.20	7.27	58
Surface	60	−1.75	.37	S. 12° W.	S. 13° W.	1.78	3.43	52

TABLE 66.—*Results of pilot-balloon ascents during "clear" periods when pressure was falling, combined data, 1929 and 1934*

10,000	5	5.16	−3.20	N. 32° E.	N. 46° E.	6.05	9.80	62
9,000	15	1.01	−2.57	N. 69° E.	N. 86° E.	2.72	11.53	24
8,000	23	2.53	−2.31	N. 44° E.	N. 63° E.	3.32	11.04	30
7,000	44	.73	−1.57	N. 65° E.	S. 87° E.	1.73	12.48	14
6,000	50	.75	.42	N. 29° W.	N. 49° E.	.85	10.14	8
5,000	76	−.65	−1.11	S. 60° E.	S. 68° E.	1.29	9.05	14
4,000	84	−2.16	−1.03	S. 26° E.	S. 20° E.	2.38	7.99	31
3,000	104	−2.69	−1.08	S. 22° E.	S. 19° E.	2.89	6.90	42
2,000	107	−4.14	−.62	S. 8° E.	S. 8° E.	4.19	6.99	60
1,000	117	−5.29	.04	S.	S. 6° E.	5.29	7.36	72
Surface	117	−2.05	.35	S. 10° W.	S. 13° W.	2.08	3.11	67

TABLE 67.—*Results of pilot-balloon ascents during "clear" periods when the pressure was steady, combined data, 1929 and 1934*

Altitude (m.)	Number of observations	N-S component (m. p. s.)	E-W component (m. p. s.)	Resultant direction from—	Mean direction from—	Resultant velocity (m.p.s.)	Mean velocity (m. p. s.)	Stability (percent)
10,000	2	0. 35	5. 15	N. 86° W.	N. 23° W.	5. 15	6. 00	86
9,000	6	3. 70	1. 37	N. 20° W.	N. 10° W.	3. 93	7. 33	54
8,000	14	2. 10	9. 34	N. 77° W.	N. 68° W.	9. 56	14. 93	64
7,000	19	. 86	7. 40	N. 83° W.	N. 45° W.	7. 45	13. 42	56
6,000	25	−1. 74	. 04	S. 1° W.	S. 61° E.	1. 74	9. 24	19
5,000	28	−3. 36	−1. 39	S. 22° E.	S. 26° E.	3. 62	8. 93	41
4,000	42	−3. 27	−2. 00	S. 32° E.	S. 39° E.	3. 81	7. 50	51
3,000	47	−3. 07	−2. 33	S. 37° E.	S. 37° E.	3. 83	6. 79	47
2,000	50	−4. 22	−1. 98	S. 25° E.	S. 25° E.	4. 64	6. 74	50
1,000	56	−3. 71	−1. 26	S. 19° E.	S. 20° E.	3. 91	5. 98	65
Surface	58	−2. 65	−. 03	S.	S. 4° W.	2. 65	3. 78	70

TABLE 68.—*Results of pilot-balloon ascents for the interval with rising pressure during "clear" periods with pressure rising and then falling combined data, 1929 and 1934*

Altitude (m.)	Number of observations	N-S component (m. p. s.)	E-W component (m. p. s.)	Resultant direction from—	Mean direction from—	Resultant velocity (m.p.s.)	Mean velocity (m. p. s.)	Stability (percent)
9,000	2	−1. 35	19. 85	S. 86° W.	W.	19. 87	21. 50	92
8,000	4	−. 40	26. 58	S. 89° W.	W.	26. 58	27. 25	98
7,000	4	−1. 30	23. 12	S. 87° W.	S. 85° W.	23. 13	24. 50	94
6,000	7	3. 03	5. 63	N. 62° W.	N. 62° W.	6. 81	17. 00	40
5,000	8	. 77	2. 96	N. 75° W.	N. 78° W.	3. 06	11. 12	28
4,000	12	− . 71	3. 13	S. 77° W.	S. 85° W.	3. 20	9. 75	33
3,000	19	−1. 18	3. 43	S. 71° W.	S. 80° W.	3. 63	8. 68	42
2,000	20	−2. 98	2. 66	S. 42° W.	S. 50° W.	4. 00	7. 65	52
1,000	21	−5. 00	. 78	S. 39° W.	S. 10° W.	5. 06	7. 19	70
Surface	21	−. 80	−. 21	S. 13° E.	S. 17° W.	. 83	2. 38	35

TABLE 69.—*Results of pilot-balloon ascents for the interval with falling pressure during "clear" periods with pressure rising and then falling, combined data, 1929 and 1934*

Altitude (m.)	Number of observations	N-S component (m. p. s.)	E-W component (m. p. s.)	Resultant direction from—	Mean direction from—	Resultant velocity (m.p.s.)	Mean velocity (m. p. s.)	Stability (percent)
9,000	2	−10. 10	2. 25	S. 13° W.	S. 10° E.	10. 35	16. 00	65
8,000	5	−6. 58	9. 38	S. 55° W.	S. 61° W.	11. 54	17. 40	66
7,000	7	−4. 41	13. 07	S. 71° W.	S. 69° W.	13. 80	18. 71	74
6,000	12	−5. 93	15. 27	S. 69° W.	S. 72° W.	16. 41	19. 92	82
5,000	14	−6. 62	13. 56	S. 64° W.	S. 69° W.	15. 10	17. 71	85
4,000	17	−5. 31	7. 22	S. 54° W.	S. 59° W.	8. 95	13. 12	68
3,000	22	−5. 30	3. 54	S. 42° W.	S. 47° W.	7. 17	9. 64	74
2,000	30	−4. 82	1. 77	S. 20° W.	S. 16° W.	5. 14	7. 93	65
1,000	34	−6. 56	. 31	S. 3° W.	S. 3° E.	6. 57	9. 53	69
Surface	38	−2. 01	−. 32	S. 9° E.	S. 8° E.	2. 04	3. 26	63

TABLE 70.—*Results of pilot-balloon ascents for the interval with falling pressure during "clear" periods with pressure falling and then rising; combined data, 1929 and 1934*

Altitude (m.)	Number of observations	N-S component (m. p. s.)	E-W component (m. p. s.)	Resultant direction from—	Mean direction from—	Resultant velocity (m.p.s.)	Mean velocity (m. p. s.)	Stability (percent)
9,000	2	6. 70	6. 45	N. 44° W.	N. 33° W.	9. 24	11. 00	84
8,000	3	5. 23	8. 63	N. 59° W.	N. 45° W.	10. 12	11. 00	92
7,000	6	−0. 05	12. 0	W.	N. 76° W.	12. 01	13. 83	87
6,000	12	−1. 09	6. 80	S. 81° W.	N. 77° W.	6. 89	12. 08	57
5,000	13	−2. 35	4. 92	S. 64° W.	S. 58° W.	5. 41	9. 62	56
4,000	19	−2. 61	2. 86	S. 48° W.	S. 40° W.	3. 51	8. 79	40
3,000	25	−3. 50	1. 78	S. 27° W.	S. 34° W.	3. 91	7. 04	56
2,000	28	−5. 19	1. 95	S. 21° W.	S. 20° W.	5. 53	8. 11	68
1,000	28	−6. 04	0. 60	S. 6° W.	S. 5° W.	6. 07	8. 07	75
Surface	28	−1. 91	−0. 01	S.	S. 5° W.	1. 91	2. 86	67

TABLE 71.—*Results of pilot-balloon ascents for the interval with rising pressure during "clear" periods with pressure falling and then rising; combined data, 1929 and 1934*

Altitude (m.)	Number of observations	N–S component (m. p. s.)	E–W component (m. p. s.)	Resultant direction from—	Mean direction from—	Resultant velocity (m.p.s.)	Mean velocity (m. p. s.)	Stability (percent)
5,000	4	6.48	2.18	N. 19° W.	N. 12° W.	6.84	9.00	76
4,000	5	6.04	2.66	N. 24° W.	N. 22° W.	6.60	11.20	59
3,000	12	.26	3.32	N. 86° W.	N. 80° W.	3.32	8.92	37
2,000	13	−3.07	3.56	S. 49° W.	S. 52° W.	4.72	7.85	60
1,000	16	−2.29	3.03	S. 53° W.	S. 52° W.	3.76	7.68	36
Surface	16	−.38	−.64	S. 59° E.	S. 9° E.	.74	2.31	32

TABLE 72.—*Results of pilot-balloon ascents for the 24 to 36 hour interval preceding "clear" periods with rising pressure; combined data, 1929 and 1934*

9,000	3	−10.53	3.57	S. 19° W.	S. 36° E.	11.11	17.33	64
8,000	6	−6.58	.77	S. 7° W.	S. 33° E.	6.64	12.17	55
7,000	11	−.88	−.87	S. 45° E.	S. 26° E.	1.26	1.26	100
6,000	13	.47	−1.37	N. 71° E.	S. 60° E.	1.45	12.08	12
5,000	14	2.40	−2.69	N. 74° E.	N. 37° E.	3.62	10.86	33
4,000	20	.95	−.48	N. 27° E.	N 66° E.	1.06	9.95	11
3,000	30	.04	.07	N. 59° W.	S. 88° E.	.08	8.53	9
2,000	42	−1.95	−.12	S. 3° E.	S. 42° E.	1.95	7.45	26
1,000	48	−2.27	−1.04	S. 25° E.	S. 26° E.	2.50	6.67	38
Surface	55	−1.65	−.58	S. 19° E.	S. 5° E.	1.76	3.87	46

TABLE 73.—*Results of pilot-balloon ascents for the 24 to 36 hour interval preceding "clear" periods with falling pressure; combined data, 1929 and 1934*

9,000	6	1.27	−2.85	N. 66° E.	N. 88° E.	3.14	7.50	42
8,000	11	1.82	−6.07	N. 73° E.	N. 84° E.	6.35	10.45	61
7,000	17	4.02	−2.89	N. 35° E.	N. 46° E.	4.92	15.12	33
6,000	24	1.10	−2.68	N. 68° E.	N. 70° E.	2.91	13.46	22
5,000	32	1.07	−4.94	N. 78° E.	N. 76° E.	5.07	11.62	44
4,000	42	−.19	−3.75	S. 87° E.	N. 86 E.	3.77	9.02	42
3,000	49	−.50	−2.78	S. 80° E.	S. 85° E.	2.84	7.47	38
2,000	61	−1.28	−2.10	S. 59° E.	S. 52° E.	2.48	6.49	38
1,000	72	−1.25	−.78	S. 32° E.	S. 36° E.	1.47	6.42	23
Surface	79	−1.71	−1.33	S. 38° E.	S. 18° E.	2.18	3.78	58

TABLE 74.—*Results of pilot-balloon ascents for the 24 to 36 hour interval preceding "clear" periods with pressure steady; combined data, 1929 and 1934*

7,000	5	−1.86	−8.66	S. 78° E.	S. 77° E.	8.86	12.14	73
6,000	11	−.25	−2.08	S. 83° E.	S. 70° E.	2.09	9.64	22
5,000	18	−1.29	−2.99	S. 67° E.	S. 78° E.	3.31	10.33	32
4,000	26	−.83	−1.14	S. 54° E.	S. 56° E.	1.43	8.27	17
3,000	30	−1.52	.15	S. 6° W.	S. 35° E.	1.53	7.27	21
2,000	37	−1.69	−.84	S. 26° E.	S. 39° E.	1.90	6.81	28
1,000	40	−2.80	−.12	S. 3° E.	S. 19° E.	2.80	5.98	47
Surface	44	−1.01	−1.48	S. 56° E.	S. 30° E.	1.79	3.41	52

TABLE 75.—*Results of pilot-balloon ascents for the 24 to 36 hour interval preceding "clear" periods with pressure rising and then falling; combined data, 1929 and 1934*

6,000	4	3.98	1.10	N. 16° W.	N. 3° E.	4.13	7.25	57
5,000	5	.70	2.62	N. 75° W.	N. 85° W.	2.67	5.60	48
4,000	6	1.28	2.22	N. 60° W.	N. 60° W.	2.58	7.00	37
3,000	12	−.21	1.78	S. 83° W.	S. 66° W.	1.79	7.17	25
2,000	16	−2.08	1.75	S. 40° W.	S. 13° W.	2.71	8.56	32
1,000	23	−1.33	−.12	S. 7° E.	S. 15° E.	1.34	9.43	14
Surface	26	−.48	−1.85	S. 75° E.	S. 43° E.	1.92	3.69	52

TABLE 76.—*Results of pilot-balloon ascents for the 24 to 36 hour interval preceding "clear" periods with pressure falling and then rising; combined data, 1929 and 1934*

7,000	2	−5.65	5.65	S. 45° E.		8.00	12.00	67
6,000	3	−7.90	−.23	S. 16° E.	S. 26° W.	7.91	11.33	70
5,000	4	−4.05	−.92	S. 13° E.	S. 18° W.	4.16	11.25	37
4,000	5	−4.14	.02	S. 2° W.	S. 37° W.	4.14	13.80	30
3,000	11	−5.94	1.16	S. 11° W.	S. 7° W.	6.06	11.54	52
2,000	14	−6.24	2.47	S. 22° W.	S. 28° W.	6.72	9.07	74
1,000	14	−6.03	1.86	S. 17° W.	S. 12° W.	6.32	8.00	79
Surface	16	−2.76	.39	S. 8° W.	S. 7° W.	2.79	5.00	56

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